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The Steam Engine in Marine Electric Lighting.

The illustration on this page was made by the ELECTRICAL REVIEW from a photograph of a plant designed by Messrs. Armington & Sims, the well-known engine builders. The work was done by them at the request of the Navy Department, and is for use where the space is limited, as is almost invariably the case on board steam vessels. A vertical engine, the speed to be 800 revolutions, was required; the principal requirement, however, was that the engine should have an automatic governor, and that the regulation of speed should be as close as the Armington & Sims standard engines.

The engine shown is a vertical double, double acting engine, and has both valves controlled by the automatic governor, and having the cranks opposite is perfectly balanced, and can be run at a high speed. The cylinders are five inches in diameter, three-inch stroke, and speed, fully loaded, 800 revolutions.

The dynamo, of Thomson-Houston make, is attached directly to the shaft, is of 100 amperes and 80 volts capacity.

The space the plant occupies is remarkably small, and is given as follows: Width, 34 inches; length, 70 inches; height, 52 inches; total weight, 3,000 pounds.

The manufacturers state that the engine has been thoroughly tested, and removing the whole load when it was running at 800 revolutions, increased the speed but five revolutions.

Automatic Clearing-Out Signal for Urban Telephony.

With the object of obtaining a reliable and automatic clearing-out signal, the author proposes a modification of the usual electro-magnet system in the switchboard of the central station, and the employment of a call-key of special construction. The modification of the indicator electro-magnets consists in this—that a magnetic armature replaces the ordinary iron armature, and that behind the ordinary *indicator drop* a second drop, *the clearing-out drop*, is inserted. Upon a call being received the magnetic armature is attracted, and remains attached to the armature of the electro-magnet, not only while any further calls occur through currents of the same direction, but also, in virtue of its own power of attraction, during conversation, and only returns to its original position at the termination of conversation through the instrumentality of a current of opposite direction sent by the calling subscriber. On depressing the key the armature, as before, releases the indicator drop and holds up the second drop until a current of opposite direction, sent by the calling subscriber, pulls back the armature and releases the second drop, which falls, and thus *gives the clearing-out signal*.

The construction of an automatic clearing-out signal is based upon a principle not hitherto applied in practice, namely, that the force necessary for closing the contacts of the clearing-out signal is produced, not as has been formerly the case, by the weight of the suspended telephone, but by the force necessary for the depression of the key. By this latter operation a spring is bent, which is prevented by the switching arrangement from returning to its position of rest as long as the conversation lasts. By the suspension of the telephone the escapement is released, the spring is pulled back, and, by a simple cog-wheel transmission, causes an eccentric to perform half a revolution. Two spring plates are hereby pressed against their contacts and a current of opposite direction to the call current is sent to line.

The advantages of this arrangement are:—

1. The clearing-out signal is given automatically, and in any case.

2. It is *only* given by the *caller:* a simultaneous suspension of the telephones cannot cause any disturbance.

3. The current is of sufficient duration.

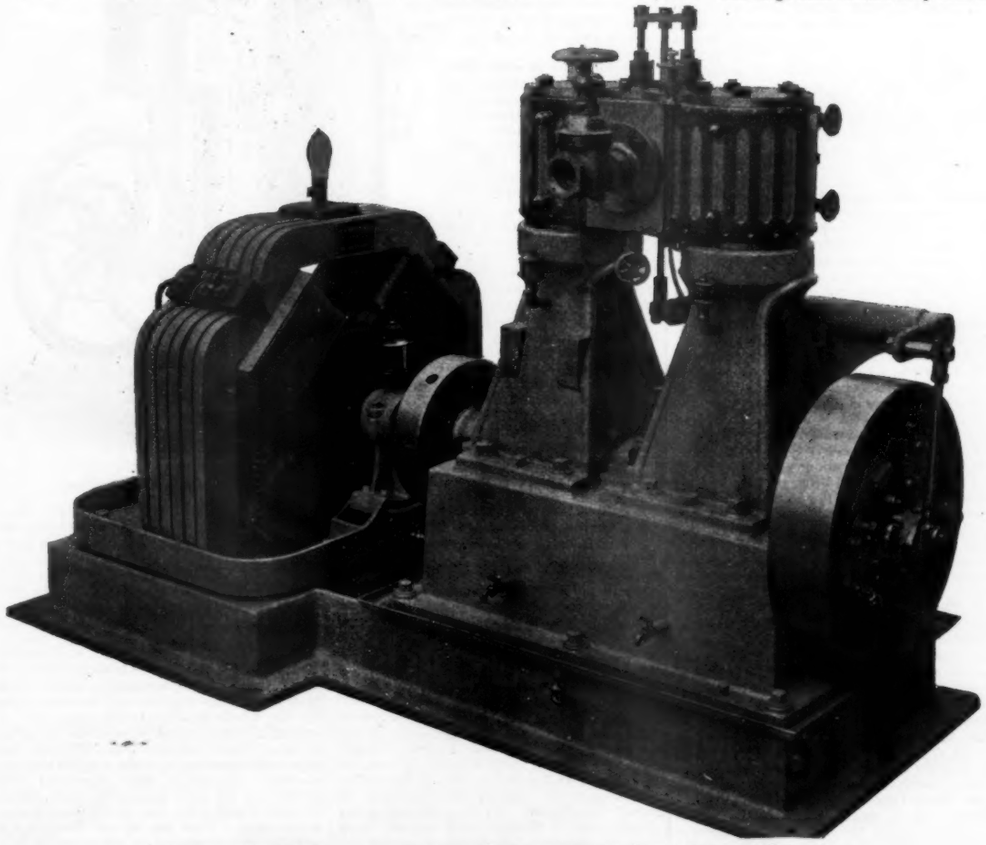
4. *No other manipulation* is required of the subscriber except the ordinary suspension of the telephone.

5. The *calling* subscriber can, without disturbing the central station, renew his call as often as he likes. After searching tests had proved the practicability of this system, the German Administration of Telegraphs has fitted up the Rostock network, installed during the current year, exclusively with apparatus of the kind described. The network was opened on 1st July with 63 subscribers, and has since risen to 90. Both subscribers and operators thoroughly appreciate the advantages of the system, which has since been worked with the greatest success and without any interruption. It remains to be seen seen whether the system could be applied to multiple-boards, but as long as the number of subscribers does not require the installation of a multiple-board, and this will be the case in many towns of moderate size, the apparatus in question will render good services for the subscriber as well as for the operator.—*Elektrotechnische Zeitschrift.*

Manager True of the electric company concluded a contract early in the week with the town of Ashland, by which he will put in there for street lighting 40 incandescent lamps of 22-candle power each and two arc lights. They will all be run from the station in South Framingham, Mass., from which wires will be extended.

Electric Lighting in the Austrian Navy.

All vessels in the Austrian Navy, including even the torpedo boats, are lighted with incandescent lamps (usually of the Siemens type) and are provided with search lights, electric running lights, the Sellner signaling electric lights, and also an incandescent lamp of from 50 to 500 candle power on the bow. The power of this light depends on the size of the vessel. It is mounted on a standard with two pivots and arms fitted with arcs and thumb-screws, so that it can be placed in any position in vertical or horizontal planes. It is fixed to the stem post, not too high above the water, and has a reflector behind it. Its province is for night navigation in crowded channels, for handling the anchors at night or picking up a buoy and, in fact, for any work about the bow. The large sizes of this lamp send a good beam of light to 250 or 300 yards, and are very useful for seeing small boats, buoys, etc. The incandescent lamps for interior illumination are from 12 to 16 candle power, are fitted with reflectors and protected by wire screens. At the gangways of the ship a small locker is attached to the netting, and contains an electric lantern with flexible cable. The search lights are the Mangin projectors, and for the torpedo catchers and torpedo boats are of 3,000 candle power. The new Austrian iron-clad "Stephanie" has a very complete electric installation. There are three large dynamos of Austrian manufacture. Incandescent lights are used throughout the vessel for interior illumination, and are of 12 candle power. There are four search lights and the usual running lights, signal lanterns, anchor stay lights, bow light, etc.



A COMPACT MARINE STEAM AND ELECTRIC PLANT.—DESIGNED BY ARMINGTON & SIMS.

Electricity in Hunting.

It has been the custom in Stillwater, Minn., for several seasons, to go goose hunting down on Lake St. Croix with a boat fitted with an electric light.

On a recent evening a party started out. The lake was covered with smoke and fog. They came on a large flock of geese, which rose, making straight for the boat, driving the men on the upper deck below.

Several of the geese struck the wheel-house and other parts of the boat.

Some 20 struck the smoke stack and rigging, stunning them, and six were captured while the others got into the water. Not a shot was fired.

Some of the Early History of Telegraph Cable Manufacture.

To the Editor of Electrical Review:

Having been for some time past engaged in collecting information in connection with the manufacture and use of electric cables, and particularly on the history of lead pipe cable making, I received recently the enclosed newspaper clipping from an old scrap book of my father's, which seems to me to possess more than ordinary interest as a curiosity of the early literature of this subject.

Professor Alonzo Jackman, the author of the publication, was at the time connected with the Norwich University, of Vermont, and as early as 1843 is said to have described in his class lectures the ideas embodied in his letter.

The letter itself he made efforts to have published in leading metropolitan journals of the day, but failing on account of the supposed folly of his proposals, he resorted to the Vermont *Mercury*, a paper then printed at Woodstock, Vt., in which the letter was published, with Professor Jackman's signature, under the date of August 14th, 1846.

Respectfully,

John A. Barrett.

Brooklyn, Nov. 12, 1889.

"A GRAND SUBMARINE AND OVERLAND MAGNETIC TELEGRAPH."

Mr. Editor:—Permit me through your columns to present to the consideration of Professor Morse, of whom every American citizen is justly proud, and to your numerous readers, the following suggestions in relation to a "Grand Submarine and Overland Magnetic Telegraph."

1. The following article is based upon these three well established principles, viz: 1. That iron and also water are conductors of galvanic fluid;—2. That india rubber (caoutchouc) is not only impervious to and insoluble in water, but is a non-conductor of galvanic fluid;*—3. That lead is not very sensibly affected by oxygen or other substances while under water.

2. Were two iron wires, each one-tenth of an inch in diameter (stretched parallel to each other and some distance apart), from America to Europe, and lying on the bed of the Atlantic; and were the European extremities of these wires joined together, while the American extremities were attached to the two poles of a galvanic battery in action; yet, the galvanic fluid would not take the circuit of the wires, but it would pass from one to the other, by water communication, in consequence of the conducting property of this element.

The fluid may, however, be forced to follow the wires, by surrounding them with a coat of india rubber; say *one-tenth* of an inch thick. This is evident, since this article is a non-conductor of galvanic fluid, and is also unaffected by water.

To secure greater safety to the work, each wire with its india rubber envelope should be incased with a lead tube, †or pipe, whose thickness may be, say *two-tenths* of an inch. Such a pipe, according to the foregoing, would be *seven-tenths* of an inch in diameter. Apparatus thus protected, would lie secure, for ages, upon the bed of the ocean; this is manifest from the non-affect of water on lead.

3. The specific gravity of the *apparatus* described in § 2, must necessarily be compounded of the specific gravity of iron, of india-rubber, and of lead. Now taking the specific gravity of rain water to be 1,000, that of iron is 7,788, and that of lead 11,352, and we will suppose that of india rubber to be the same as that of rain water. From these data, together with the several dimensions of the apparatus given in § 2, we calculate the specific gravity of said apparatus to be 9,591. According to experiments referred to by Prof. Olmstead, (see Olmstead's Nat. Philos., vol. 1, page 307.) "At the depths of 1,000 fathoms, the compression of water is one-twentieth of its bulk, and its specific gravity is increased in the same ratio; so that bodies which sink near the surface of the sea may float at a certain depth before they reach the bottom." Query, would our apparatus float, and thus be exposed to the revelrout of deep-sea monsters?

According to established principles in philosophy, a body will continue sinking in a fluid, so long as the specific gravity of the former is greater than that of the latter; and when they are equal it will stop. Hence said apparatus will descend to a point where the specific gravity of sea-water is 9,591.

Now the specific gravity of sea-water at the surface is 1,026, and according to the foregoing, at the depth 1,000 fathoms, it occupies only $\frac{1}{20}$ of its bulk at the surface. Furthermore, at every succeeding depth of 1,000 fathoms, the bulk is decreased in the same geometrical ratio. Again the density of the same fluid is inversely as its bulk. From these data we find, by calculation, that at the depth of 261,461 feet, 49½ miles, the specific gravity of sea-water would be 9,591, the same as that of said apparatus. Consequently, the telegraphic pipes would not float until they had descended to the depth of 49½ English miles. Here would be a thick fluid, denser than iron, for the monster of the deep to sport in.

4. It is reasonable to suppose that the bed of the ocean bears a proportional resemblance to the surface of dry land. If this be so, the deepest places in the ocean cannot much exceed five or six miles. Prof. Hitchcock states in his geology that, "The mean depth of the ocean is probably between two and three miles." (De la Beche's Man. Geo., p. 2.) It has been calculated from the phenomena of tides that the Atlantic in its middle part is not above nines miles deep. (Phillip's Geology, p. 23, Edinburgh, 1838.)

The greatest depth ever conjectured has not, to my knowledge, exceeded 12 miles.

Hence, there is no doubt as to our apparatus sinking to the bottom of the ocean, for we have before seen that it would sink much lower than the estimated depth of the ocean, even to 49½ miles, should no bottom be found, and the water not become a solid.

5. By the work of coral insects, and other analogous animals, together with oceanic deposits, apparatus lying upon the bed of the ocean, as we have supposed, would in a short time be incorporated with and become a part of the crust of the earth.

Should fears be entertained that the internal volcanic heat of the earth would melt the india rubber from the tattle-wires and thus let the tattle fluid escape among monsters of the deep—frightful to think of it! Why, to avoid all danger, let the telegraph be located out of a volcanic region.

6. The distance from Boston to Liverpool is 3,229 English miles; hence the total length of the two telegraphic pipes connecting those cities, after making due allowance for an uneven oceanic bed, and other contingencies, would be, say about 6,600 miles.

According to the several dimensions of the respective parts of the apparatus given in § 2, together with its length, there would be required for its construction: 1. iron wire, 924,825 pounds, which would cost, at 10 cents per pound, $92,485.50; 2, lead, 5,392,200 pounds, which would cost at five cents per pound, $269,610; 3, india rubber, 15,205 cubic feet, weight and cost unknown. Consequently the whole weight of the telegraph apparatus would be about 3,000 tons, or each line of pipe 1,500 tons.

For the requisite purpose, wire one-twentieth of an inch in diameter, instead of that described in § 2, would, no doubt, be sufficiently large. According to this view of the case, a lead pipe, one inch in dia.neter, would enclose within the same india rubber wrapper about 36 tattle wires. Query, would not one wire answer the same purpose of the 36 wires lying side by side, were it not for strength and flexibility? Thus we see, that with a very little increase of cost, so far as lead and india rubber are concerned, the number of wires in each pipe may be greatly multiplied. By this means, many cities, both in America and Europe, may have independent telegraphs protected by the same lead pipe, and thus enjoy uninterrupted gossip.

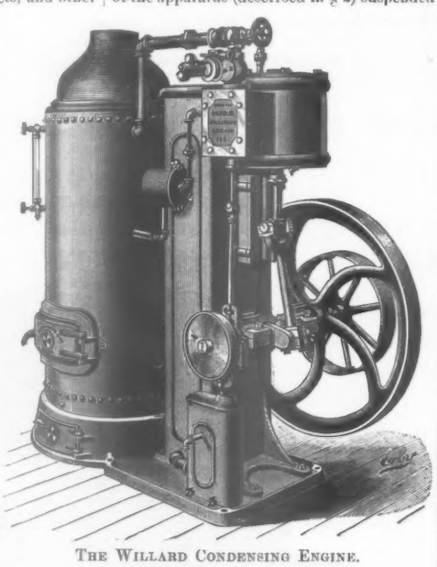
8. There would be no serious trouble, I think, in reference to "pipe laying," for when we consider the skill exhibited by the Philadelphians and New Yorkers, in this department of business, during 1840, all fears vanish.

In reference to locating pipe, I will here venture the following suggestions: By § 6, one of the lines of said pipe would weigh 1,500 tons, half of which, 750 tons, would be a good cargo for a steamship. Now let two steamships, sufficiently large, each having 750 tons of said pipe judiciously coiled in the hold, accompany each other to a point half way between Boston and Liverpool; then let an artist splice the two halves of the apparatus together, wire to wire, rubber to rubber, and pipe to pipe. Next let one ship head towards Boston, the other towards Liverpool, and each "put on steam" and pay out pipe according to the circumstances of the case. The pipe would sink down and admirably fay to the bed of the ocean. In like manner, and at the same time, the other line of pipe might be located. Thus, in a few days, would be located in the two pipes 36 or more distinct telegraphs, by which 72 or more large cities might be connected; the proportional expense, for each city, would be but a drop in the bucket.

Instead of each pipe being located by two steamers, a greater number might be employed and kept in their proper direction by others (if necessary) stationed in sight of each other, for guides on the "line," as the locomotive steamers should respectively separate from, and meet with each other; well instructed artists might splice the apparatus, and let it go down. Thus in one day the two lines of pipe could be located from America to Europe.

9. Let us for a moment examine the cohesive force of our telegraphic apparatus, and see if it will be sufficient, while locating, to prevent the necessary strain from parting the work asunder. If a sufficient number of iron wires be taken, so that the aggregate of all their cross sections shall be equivalent to one square inch in surface, these wires will together just sustain the weight of 113,077 pounds, while bad wire under the same circumstances will sustain but 3,146 pounds.

Furthermore, as before stated, the specific gravity of iron is 7,788, while that of lead is 11,352. (See Grice's Mechanical Dictionary.) From these data, we calculate that were iron wire suspended in space, its cohesive force would be sufficient to sustain somewhat more than six miles of its own length, while under the same circumstances, the length of lead wire will fall considerably short; consequently were six miles in length of the apparatus (described in § 2) suspended in space, the lead pipe would part asunder, and slip off by the wire, leaving the interior wires, with their rubber coat, still aloft.



The Willard Condensing Engine.

Now, in order to prevent the lead pipe from breaking, let strong bands of iron (each having holes drilled through them to pass wires) be slipped on, and well soldered to the exterior of the pipe; these bands should be at suitable distances from each other—say 1,000 feet. Moreover, let a sufficient number of strong wires be stretched between every two consecutive bands, into which their extremities shall be well fastened; also let the whole be wound with spun yarn or something more suitable; and this in order to keep these exterior wires close to the pipe while handling it under various circumstances. Apparatus thus supported will sustain, of its own length, in space, about five and a half miles, and in salt water, about seven miles. Thus far we see that our apparatus will probably be adequate to any depth of the ocean. (See § 4.)

Should the ocean prove to be too deep for the strength of our apparatus to sustain a length that would reach to the bottom, it may, by means of attaching buoys, be suspended in the water at a suitable depth below the surface, and thus abate the strain that would otherwise be exerted on the apparatus while paying it out of the ship. These buoys should be of such a nature as would absorb the water slowly, and thus gradually sink and ultimately reach the bottom; for this purpose many kinds of seasonwood will answer. If it should be thought necessary to retard the sinking process still more, the buoys might be overlaid with some chemical preparation which it would require the water a given time to dissolve. Therefore everything may become subjected to the will of the engineers. Hence said apparatus can be located with perfect safety in any desirable part of the ocean.

10. Of the 36 or more distinct telegraphs, delineated in § 7, let us suppose the distribution to be something like the following: Let Boston, New York and Philadelphia each have four sorts of wires connecting them, respectively, according to their choice, with four European cities. In the same manner, let Baltimore and Charleston each have one set of wires; New Orleans three and Washington seven, connecting it, if necessary, with as many capitals in Europe. Moreover, suppose four sets of wires lead off from London, destined for Canada, China, Calcutta and Botany Bay; also let four sets of wires from Paris be destined for the Pacific region; and let the Spanish and the Dutch each have two sets, destined for their East India possession. In like manner more cities and nations might participate in the Grand Compound Telegraph. Thus the 36 sets of wires are disposed of.

11. Let us now take a general view of the subject before us. Suppose the compound telegraph so located, that from the several European cities engaged in the work, their respective sets of wires should lead off to the verge of the ocean, there, along on the bed of the ocean, in lead pipes, to a point somewhere near the British Channel, where writing, the positive branches would form the positive trunk, and the negative branches the negative trunk; thence onward in the two main trunks to the American shore, where the two trunks would rise with majesty from the ocean, sending out and taking in wires as they passed Halifax, Boston, New York, Philadelphia, Baltimore and Washington; thence westward, accompanying Whitney's contemplated railroad to Oregon and the Pacific Ocean; thence along on the bed of the Pacific, dismissing and receiving branches as it passed the Sandwich and Phillipine islands, until all the wires shall have reached their respective places of destination. This is the grand telegraph proposed to be presented in the heading of this article.

12. Who could calculate the blessings which humanity would derive from the effects of such a magnificent telegraph? I will just hint at a few items.

First, in a political point of view, war would be at an end, for I think it may be truly said that delay of intelligence is the life of war.

Both parties might discuss the subject of treaties at home. For instance, the United States Senate and the British House of Lords could sit, as it were, in their tent door in the cool of the day, and converse face to face, upon great national questions; the experienced statesman will readily see the inestimable, political advantage to be derived from said telegraph.

Secondly, on commerce.—The merchant can see how his purchases and other requisite arrangements may be made before his ships put to sea. All departments of his business would be stripped of the double perplexities, and dangers now necessarily accompanying them.

Thirdly, in science.—General knowledge upon all subjects would increase mightily until it should be equalized among the inhabitants of the earth, knowledge in meteorology would be systematized and astronomical observations could be taken on different parts of the earth at the same instant, by which means much might be discovered that is now unknown. The longitude of places could be given to perfection. Time would fail me to mention all the advantages gained under this head.

Fourthly.—This would be a new era for missionary operations. Heathenism would be entombed, and the whole earth would be illuminated with the glorious light of Christianity; and this might be the time spoken of in Rev. 14:6, "And I saw another angel fly in the midst of heaven, having the everlasting gospel to preach unto them that dwell on the earth, and to every nation, and kindred, and tongue, and people."

Fifthly.—Civilization would of course go hand in hand with other improvements, and all the inhabitants of the earth would be brought into one intellectual neighborhood, and be at the same time perfectly freed from those contaminations which might under other circumstances be received.

Lastly.—When we consider the time, outfits, misfortunes, dangers and loss of life, and retardations in business, which are now necessarily connected with all human affairs and which might be avoided by the proposed telegraph, it is evident that such a work would every year infinitely more than compensate for its construction.

Alonzo Jackman.

Norwich University, Vt., Aug. 14, 1846.

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* Dr Turner, in his chemistry, classes india rubber with the rosins, which he says are non-conductors of electricity; if, however, on examination it should be found otherwise, then all we have to do is simply to put a suitable coat of cloth, well saturated with varnish, around the wires inside the india rubber envelope which would still be an useful protection.

† The telegraphic wires should in no case touch the lead pipe, lest a reverse current of galvanism might be produced. Furthermore, from the fact magnetism is mysteriously communicated to iron, when, without metallic contact, the galvanic fluid passes around it, we may anticipate some mysterious development in passing said fluid through a metallic pipe, though there should be no contact,—experiment, however, will decide this point.

—— Boston capitalists are talking of erecting an electric light plant at Middle Falls, Mass., utilizing the water power at that place. A meeting was held at the Hotel Schuyler to make arrangements for lighting Schuylerville with electricity, naphtha lamps being now in use. Greenwich, it is said, will also be illuminated by this company. Middle Falls is three miles from Schuylerville and the same distance from Greenwich.

Electrical Apparatus for Coal Mining.

Day by day new industries are calling on electricity for help, and, faithful servant that it is, its response is ever "Thou hast called me, and I have come."

Within a comparatively short time a loud call has been made for an electrical application for mining purposes for the cutting out of coal in the underground store houses of nature for the use of man.

Now at first it seems easy to accomplish this apparently simple result; but experience has shown that there is more to be provided for than shows on the immediate surface.

Firstly, the apparatus must be in every sense of the word thoroughly practical, and able to withstand the roughest usage under probably the worst possible circumstances and surroundings. Constant changes of temperature will subject it to frequent vapor baths, water is likely to drip from above at any unexpected moment, or perhaps continuously, and at any time without previous note of warning, masses weighing tons, perhaps, of coal or slate may be disengaged from the roof of the mine, and bury it. It must be so constructed as to anticipate these and numerous other destructive happenings, and come from the ordeal unharmed.

The Jeffrey Manufacturing Company, of Columbus, Ohio, has for several years been constructing the Legg coal mining machine, operated by compressed air. This has not been altogether satisfactory, and the company has for two years been making earnest attempts to use electrical energy in place of air for that purpose, and no unconsiderable amount of money has been expended without success.

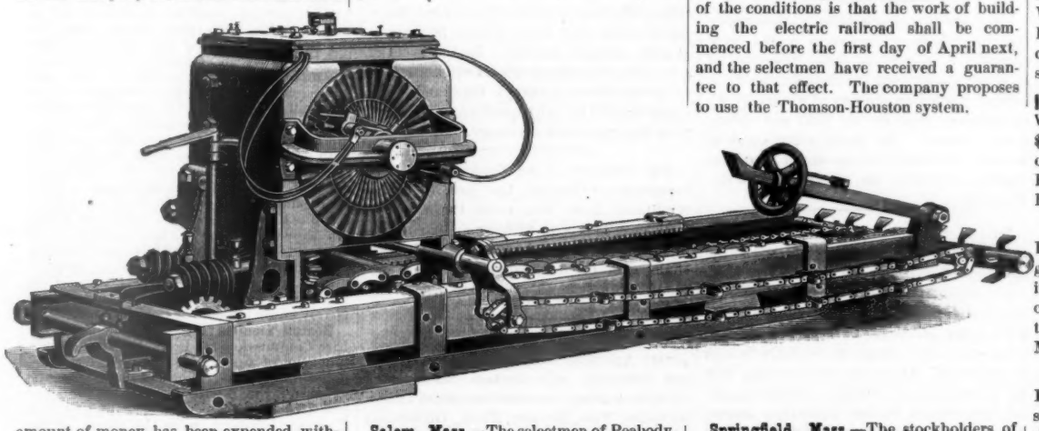
Recently, having pretty much exhausted their local resources and failed to accomplish the desired end, the company enlisted the services of Mr. Forée Bain, of Chicago, who for the time being became a miner in order to study the difficulties to be overcome.

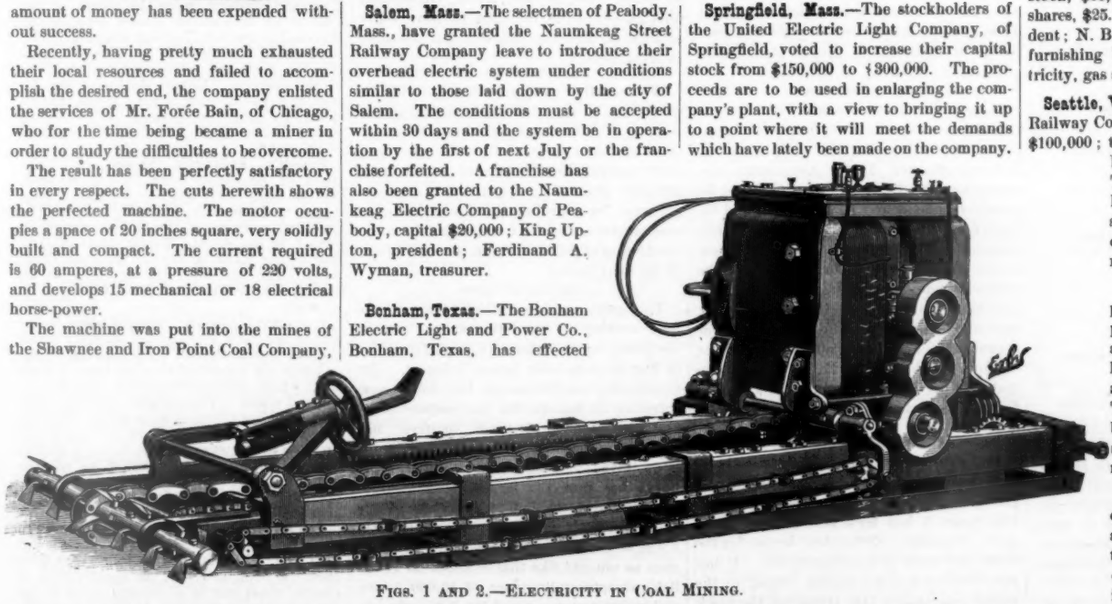
The result has been perfectly satisfactory in every respect. The cuts herewith shows the perfected machine. The motor occupies a space of 20 inches square, very solidly built and compact. The current required is 60 amperes, at a pressure of 220 volts, and develops 15 mechanical or 18 electrical horse-power.

The machine was put into the mines of the Shawnee and Iron Point Coal Company, Shawnee, Ohio, on the 1st of May, and has been in constant operation daily since that date. It makes a cut five and a half feet deep by three feet face in three and a quarter minutes, or including the withdrawal of the cutter bar in four minutes. The machine is so readily portable that only 10 minutes are required to do the work and place it for a second cut. At this rate 60 cuts per day of 10 hours are made, turning out 200 tons of coal per day. This is the work of the first machine. It is presumed that at least one-half more coal can be undercut by a second machine.

In addition to the above, there is included in the installation an electric hauling apparatus, of Mr. Bain's designing and construction, and a lot of incandescent lamps.

A 20 horse-power electric locomotive and three more mining machines are now being constructed for the Jeffrey Company by Mr. Bain.





FIGS. 1 AND 2.—ELECTRICITY IN COAL MINING.

Duquoin, Ill.—The Secretary of State has issued papers of incorporation to the "Duquoin Fuel, Light and Power Company," for the purpose of furnishing fuel, light and power to city. The capital stock is $50,000, and is incorporated by J. R. Truesdale, D. Shepard and R. M. Foster, all of St. Louis. The company is pushing the gas works plant to an early completion.

Mt. Morris, N. Y.—A company has been formed in Mt. Morris, of which F. M. Joslyn is secretary, where is proposed to erect an electric light plant. The company made a proposition to the village trustees to supply three arc lights of 800-candle power; 10 incandescent lights of 32-candle power and 60 incandescent lights of 20 candle power, to burn all night for the sum of $1,000 per year, if the trustees will consent for a term of 30 years. The village trustees at a meeting last week passed an ordinance granting the franchise for the company's plant.

Salem, Mass.—The selectmen of Peabody, Mass., have granted the Naumkeag Street Railway Company leave to introduce their overhead electric system under conditions similar to those laid down by the city of Salem. The conditions must be accepted within 30 days and the system be in operation by the first of next July or the franchise forfeited. A franchise has also been granted to the Naumkeag Electric Company of Peabody, capital $20,000; King Upton, president; Ferdinand A. Wyman, treasurer.

Bonham, Texas.—The Bonham Electric Light and Power Co., Bonham, Texas, has effected an organization, with Dr. Benjamin Dabney as president and John W. Russell, treasurer. A 30 years' franchise has been granted the company, and a contract for lighting the city for the same length of time. They have placed their order for apparatus with the Heisler Electric Light Co., of St. Louis, manufacturers of the well-known long-distance system of incandescent lighting.

The Willard Condensing Engine.

We are pleased to present an illustration of the Willard condensing engine in this issue of the ELECTRICAL REVIEW. For isolated plants and for private residences this engine has become quite popular in the short time it has been before the public. The manufacturers, Messrs. Chas. P. Willard & Co., 236 Randolph street, Chicago, Ill., are pleased with the success which has greeted the introduction of this engine. We are sure our electric lighting readers will be interested in the matter, and all who care to address Messrs. Willard & Co., will receive a catalogue describing in detail the engine and all its parts.

Seattle, W. T.—Jackson County Electric Railway, Light and Power Company, of Seattle. Capital stock, $50,000. Trustees, W. H. Lewellyn, J. F. Eshelman, W. W. Kirkwood, Fred. B. Converse, C. J. Eddy and R. R. Spencer. Object, to build and maintain street railways and electric lights.

San Francisco, Cal.—The California Water, Gas, Light and Fuel Company has been incorporated, to manufacture and sell an automatic gas machine. The capital stock is $250,000, divided into 50,000 shares of $5.00 each, all of which have been actually subscribed. Directors, Henry Pease, L. S. Starkweather, J. H. Russ, J. W. Brown and D. C. Scott.

Randolph, Mass.—The Board of Selectmen have granted the Randolph and Holbrook Light and Power Company a franchise to operate a plant in Randolph. One of the conditions is that the work of building the electric railroad shall be commenced before the first day of April next, and the selectmen have received a guarantee to that effect. The company proposes to use the Thomson-Houston system.

Springfield, Mass.—The stockholders of the United Electric Light Company, of Springfield, voted to increase their capital stock from $150,000 to $300,000. The proceeds are to be used in enlarging the company's plant, with a view to bringing it up to a point where it will meet the demands which have lately been made on the company.

Lowell, Mass.—A company of local capitalists are soon to organize an electric company on the storage battery system recently patented by J. Y. Bradbury, local agent of the Thomson-Houston Company, and F. J. Stone. It is claimed that in this new patent the difficulties encountered in other batteries by the action material scaling or falling out, or the plates buckling, are entirely overcome.

Brocton, Mass—The Waters Electric Time Switch Company, of Brocton; capital, $25,000. Moses E. Hatch, president; Walter F. Jones, treasurer.

Townsend, W. T.—Capital stock, $20,000; trustees, N. J. Levinson, Ralph E. Moody and J. P. Betts. Object, to construct and operate a district telegraph.

Florence, S. C.—W. R. Barringer is organizing a company to erect an electric light plant to cost about $30,000, for the purpose of lighting the town of Florence.

Detroit, Mich.—The White Electrical Company, of Detroit, have filed articles of incorporation. G. M. Wetherell, A. E. White, J. H. Brewster and W. W. Chapin are the incorporators.

Chicago, Ill.—The Chicago Phonograph Company, at Chicago; to manufacture phonographs and phonograph-graphophones; capital stock, $75,000. Incorporators, C. W. Drew, F. S. James and William Tyler.

Baltimore, Md.—The Electrical Construction Company has been incorporated by C. W. Huntington, H. G. Lee, T. W. R. Duvall and others, to manufacture electrical machinery and supplies. The capital stock is $12,000.

San Francisco, Cal.—The California, Water, Gas, Light and Fuel Company, with $250,000 capital stock, in 50,000 shares, all of which have been subscribed. Directors, Henry Pease, L. S. Starkweather, J. H. Russ, C. W. Brown and D. C. Scott.

Chicago, Ill.—The Magnetic Fire and Police Alarm Company, at Chicago; to engage in manufacturing, operating and dealing in mechanical devices for fire alarms; capital stock, $500,000. Incorporators, Milton Weston, U. W. Weston and R. H. Mason.

Eastport, Me.—The Eastport Gas and Electric Company, Eastport, Me. Capital stock, $50,000. Paid in, $375. Par value shares, $25. S. D. Leavitt, Eastport, president; N. B. Nutt, Eastport, treasurer. For furnishing light, heat and power, by electricity, gas and steam.

Seattle, W. T.—The Ranier Power and Railway Company, of Seattle. Capital stock, $100,000; trustees, George Kinnear, D. T. Denny, Roger S. Greene, D. Thomas Denny and John B. Denny. Object, to build, construct, acquire, maintain and operate steam cable and electric railroads in Seattle.

Huntington, L. I.—The Empire Gas and Electric Light Company, of Huntington, has filed articles of incorporation at Riverhead. The capital stock is fixed at $200,000, shares $10 each. The company has purchased the brick necessary for the buildings at Keyport, and they have already been shipped.

Newark, N. J.—A new electrical company has been incorporated at Trenton, to be known as the McDougall & Martin Electrical Company. The capital stock is $500,000, and $100,000 is paid in. The incorporators are W. E. Westcott, of New York; William McDougall, of East Orange, and Julius Martin, of this city. The company is organized for building street car railroads by direct current and storage batteries, and for central station work in supplying power for motors. The factory will be established in New York under the direction of Mr. McDougall, with Mr. Martin as electrician.

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We invite correspondence from Electricians, Inventors, and the Telegragh and Telephone fraternity and those engaged in Electric Lighting, on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

NEW YORK, NOV. 23, 1889.

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Nearly all foreign navies are using electric lighting devices of American origin, and no vessels, so far as known, have yet been provided with installations superior to those equipped by the United States Government, either in perfection of design or quality of workmanship.

It is most interesting to read the ideas of those who anticipated great events, and to see how near they came to being fulfilled. The article on another page by Prof. Jackman, written in 1846, describing how to manufacture a submarine cable and what would result from connecting two hemispheres, will be read with interest by every one.

The electrical visitors to the Paris Exposition are all getting back to America, and everyone is enthusiastic for a World's Fair here in 1892.

Electricity will be able to make the most interesting and most extensive showing of any one industry at the World's Fair. It should be properly recognized and represented to secure this desirable end.

The Western Union Executive Committee have resolved to accept the Government telegraph business at the new rates established by the Postmaster-General, but under protest, until a settlement can be obtained of the points in dispute.

The wire-tapping chap is apparently around again in New York. One day recently a telegraph line from the race course was tapped and run into a room where some operators had an outfit, and were able to get the result of the races in advance and speculate to their advantage. Some 30 battery cells were found by the police, but the guilty parties have not yet been discovered.

Justice Edwards has granted to the Hudson River Telephone Company a temporary injunction restraining the Watervliet Turnpike and Railroad Company from operating the single trolley electric motor system within the city of Albany. The injunction will remain in force until the last Thursday of this month, when a motion to make the injunction permanent will be argued.

There are several questions of importance that the telephone managers in the large cities have to contend with, the chief of these at present being the disturbance of the delicate telephone current of electricity by the much stronger electric light and electric power currents. The many bright minds at work in this field will no doubt be able to satisfactorily solve the problem and do justice to all.

Mr. J. S. Stone, who assisted Messrs. Sargent and Bishop in representing the American Bell Telephone and Western Electric Companies at the Paris Exposition, has returned to New York. Mr. Stone is making a study of electrical science, a field of work which his talents particularly fit him to succeed in. Although quite a young man Mr. Stone is an accomplished linguist, speaking a number of foreign languages, among them the difficult Arabic, which he learned during a residence of thirteen years in Cairo, Egypt, with his father, the late Gen. Stone, of the U. S. Army.

Should the State electric light associations prove a popular thing and each member of these organizations unite with the National Electric Light Association, the strength of the latter Association would be greatly increased and its usefulness and influence much enhanced. The Massachusetts Association, as reported in the REVIEW recently, starts off well, and it remains to be seen how many other States will follow this excellent example. The electric lighting men should be awake to the necessity of organization and closer affiliation, and the method which Mr. A. R. Foote is now so zealously advocating promises much good for this important and rapidly growing industry.

It would almost take a good sized book to describe the uses to which electricity is put by the Pennsylvania Railroad Company. For years it has been keenly alive to the great adaptability of electrical devices for the every day needs of its departments. It has just achieved another success owing to the safety guaranteed fast trains by the block signal system, and now is daily running a fast express train through from New York to St. Louis on a schedule many hours shorter than any other railroad. There is a sense of security in running trains protected by an electric safety system which inevitably insures faster service to the traveler, and no train can run too fast for the American traveler.

THE TELEGRAPH CODE OF THE MILITARY SERVICE.

General A. W. Greeley, the Chief Signal Officer, has ordered the discontinuance of the use of the "General Service," or Myer telegraphic code in the military service, and hereafter the American Morse alphabet will be exclusively used, both on telegraph lines and in communication by flag signals. The Myer alphabet is composed entirely of dots and contains only two elements, one dot representing the figure 1 and two dots the figure 2. A few examples will show the cumbersome character of this code:

A	22
B	2112
C	121
M	1221
Z	2222
1 (one)	21112
3	22122
0 (naught)	22222

The transmission of such a jumble of dots over a line was always tedious, distracting and exceedingly slow, even when used by expert operators, and, when attempted by soldiers, was seldom of any practical use. In signaling by flags and torches a motion to right signified "1," and a motion to the left signified "2."

In sending Morse characters with flags or torches the dot is represented by a motion to the right and the dash by a motion to the left of the sender, a slight pause at the lowest point of dip being made to indicate a *long* dash, while a *space* is represented by a "front" motion. The rate of transmission by this method is four or five words per minute. Experiments made at the Signal Office office demonstrated that a good Morse operator can read and record the flag signals at sight, without practice. In the event of a war the army signal officers will know how to operate Morse telegraph lines, and Morse operators will be fully qualified to telegraph with flags whenever necessary.

The treasurer of the Mexican Telephone Company, at Boston, has just received a remittance from Mexico for the profits of October. This is the fifth consecutive month of such receipts, and each month shows a slight gain on its predecessor. The telephone business of this continent is generally good.

J. A. Mitchell's article on "Contemporary American Caricature," in the December *Scribner's*, will contain cartoons by 17 of the leading American humorous artists, including Nast, Keppler, Frost, Gibson and McVickar. It is intended to have other articles on French, English and German caricaturists.

We learn that an improved process for the production of aluminum and magnesium has recently been invented, by which the cost of these abundant metals will be reduced to a point enabling them to be used for industrial purposes generally. Arrangements are in progress for working the inventions on a commercial scale, and for applying it to the production of metallic chromium and others of the rarer metals.

The great progress which America has been making in the last year or two in electricity seems to have awakened the cities of Europe from their latent lethargy. An electrician from Pittsburgh, Pa., who is now traveling in Europe for the purpose of investigating some electrical matters, has written to a friend in Pittsburgh, and in his letter says: "While it is true that Pittsburgh has now the largest electric light plant in the world, I think that some of the European cities will soon rival our gas city. I was in Venice not long ago and I find that even an old city like that is about to establish an electric light plant of 15,000 lights, and what may be especially interesting to you is the fact, that the Westinghouse Electric Company will furnish the machinery for the central station. The city of Berlin is also being supplied with a central station plant of even 60,000 lights. In Vienna a plant of 20,000 lights is now in operation, while in addition three others are being put in, each with a capacity of 15,000 lights. And so it goes, all over the continent and England."

ELECTRICAL NEWS.

What is Transpiring in Electrical Circles in the Leading Cities.

OUR BOSTON LETTER.

Navy Yard.—An appropriation of $15,000 for an electric light plant at the Charleston Navy Yard has been asked for.

Newton, Mass.—President H. M. Whitney, of the West End Company, and other prominent guests, were entertained recently by the Young Men's Assembly, an association of business men. The banquet, held in the Town Hall, was followed by a discussion of the subject of widening Mt. Auburn street, to allow room for an electric street railway.

New Lines Running.—Last Thursday the electric cars between Grove Hall and the Tremont House, via Warren and Dudley streets and Shawmut avenue, began running on a 10 minute schedule. Two engines and six generators are now in place at the central power station, and the three other engines and nine generators, which are to constitute the temporary plant, will be put in as rapidly as possible. It is now expected that the electric cars between Harvard and Park squares, via Charles street, will begin running within a day or two.

New England Wiring and Construction Company.—This company has just increased the plant of the Marlboro, Mass., electric light station by two 600 light Edison incandescent machines. The Boston Belting Company have had their plant increased 600 lights, and the Edwards Manufacturing Company, of Augusta, Me., have ordered a plant which is to furnish them 800 lights.

The Westinghouse Company have nearly completed an entire central station plant, which they have been installing in their offices at 620 Atlantic avenue, for exhibition purposes and also to furnish light for the offices. In the basement a 500-light alternating current machine is driven by a Westinghouse high-speed engine, and the connections and wiring are models in their way. A 100 volt current is used in the basement, but when carried up into the offices, it passes through converters which reduce it to 50 volts. The converter system is very thoroughly illustrated, and one cannot help but admire the ease and simplicity with which a current of high tension is reduced so as to be available for house and office lighting. The switchboard is very handsome and, situated in the main office, exhibits to advantage all the fixtures which are shown upon it. These include street lamps in series, motors with fan attachments, porcelain cut-outs and rosettes, amperemeters and voltmeters entirely encased in glass and everything necessary to completely equip a model switchboard.

Boston Electric Club.—Mayor Hart, the Fire Commissioners, B. S. Flanders, superintendent of fire alarms; Henry A. Chase, police electrician; W. E. Decrow, of the Gamewell Fire Alarm Telegraph Company, and Charles Holtzer, of the Holtzer-Cabot Electric Company, were the guests of the Club at the semi-annual dinner given at the Boston Tavern last Tuesday evening. The president of the Club, W. J. Denver, occupied the chair and introduced the speakers of the evening. Mayor Hart said that he was in favor of such a plan in the use of electricity and the running of wires as would best result in the comfort and safety of the public.

Rowell's Automatic Switch.—A large party of gentlemen from Boston, Lowell, Nashua and other neighboring cities went down to Lynn last Thursday to see the practical working of the Rowell automatic switch in use on the Myrtle street electric line of the Lynn & Boston Railroad Company. The car was run across it at all speeds, the switch never once failing to do its work.

It is operated by two upright arms at the side of the track near the rail, directly under the axle box of the car. These upright arms or levers are connected to arms upon a rock shaft which controls the switch tongue by a rod and crank. The upright arms are operated by either of two wheels hung from the axle box, which, when not in use, are drawn up close to the truss of the car by a spring, and are brought into position to set the switch by a lever in front of the driver to be operated by hand power, or can easily be arranged to be operated by foot power.

The Annual Meeting of the stockholders of the West End Street Railroad Company was held last Thursday. The following facts from the official report on construction of electric roads may be of interest: Cost of line construction, comprising 14.06 miles double track, 3.175 miles single track, in all equal to 31.295 miles single track, $146,546.70. Cost of incomplete work on lines under construction, which includes the labor cost of setting 1,678 poles, $6,239.93; cost of cement, stone and other materials, and expenses of setting; also purchase of 1,655 poles, $40,565.45—$46,859.38. Total, $193,406.08.

Power stations—Cost of Allston station, land, buildings, chimney and equipment, $116,426.65. Central power station, amount

thus far expended in construction and equipment, $40,149.20. Total, $156,575.85. Electric car houses and shops, $16,333.32; engineering and general expenses of electric construction, $46,286.74; electric cars, $150,973.64; total cost of construction, $362,674.63.

The Boston Press Club were entertained at their rooms on Saturday evening by an exhibition of the electrical piano, which was very much enjoyed by all the members.

Electrical Glass Company.—This is the title of a new corporation which is being formed in this city. The company have about concluded the purchase of the entire plant of the Sandwich Glass Company which they will operate in the exclusive manufacture of glass goods for electrical purposes. Several valuable patents are owned by the company, among others being one for making a perfect thread on the inside of an insulator. S. L. C.

Boston, Mass., Nov. 18.

OUR CHICAGO LETTER.

An Interesting Catalogue.—George Cutter has just issued a valuable catalogue. The first 27 pages contain tables of information, dimensions and resistances of pure copper wire, equivalents of wires, tables showing the difference between wire gauges, volts lost at different per cent. drop, incaudescent wiring tables, etc. On pages 10 and 13 will be found tables that are especially valuable, showing the amperes per motor at efficiencies for various horse-powers up to 150, and various voltages up to 1,200, and amperes per lamp of various candle-powers and voltages. The balance of the catalogue is devoted to a description of supplies and prices, so arranged that at a glance one can tell what is needed in each department and the cost of same. Mr. Cutter is manufacturing for immediate shipment 5,000 small hoods for street lighting to fit Thomson-Houston and Westinghouse lamps, and 2,000 large street hoods. Special attention has been given this matter, in the study of the curves, to give the greatest radius to the light.

Sales.—Mr. Bowen, of the Hawkeye Electric Company, has just returned from a northern trip and reports the following sales: Drake Block, St. Paul, Minn., 300 incandescent; Earhuff Organ Company, 250 incandescent; Bloomfield, Iowa, 700 incandescent; Moline Wagon Company, Moline, Ill., 300 incandescent; Davenport Grain and Malt Company, Davenport, Iowa, 100 incandescent.

The Excelsior Electric Company report the following sales for the past week: Village of Blue Island, Ill., 30 arc lights; Queen City Electric Light Company, Gadsden, 30 arc lights; Alabama Union Stock Yards and Transit Company, 30 arc lights and a Corliss engine of 150 horse-power capacity; one 5 and one 3 horse-power motors to the Consolidated Electric Light and Power Company, Kansas City, Kas.; one 3 horse-power motor to the Charlotte Electric Light Company.

Notes.—The Electrical Construction and Supply Company reports the closing of a contract for wiring the Julien Hotel at Dubuque, Iowa, for a 150 return call annunciator.

The Electrical Supply Company have lately received a large shipment of underwriters' wires of all sizes, which is noticeable for its smooth finish.

Gas Engines.—The Chicago branch office of the Otto Gas Engine Company sold to-day the largest gas engine used in the United States and undoubtedly the largest used for driving electric light machinery in the world. The engine is of 100 horse power capacity and will be used by the Oskosh Electric Light Company, Oskosh, Wis., in driving Brush arc dynamos. This engine was ordered on the strength of a severe test given two of these engines, one of 40 horse power and one of 50 by the same company at Racine, Wis.

Personal.—R. T. McDonald, of the Fort Wayne Electric Co., with his private secretary, arrived in the city on Friday.—Walter K. Freeman, of the National Electric Co., of Eau Claire, Wis., was a recent visitor in the city.—Norman Williams, president of the Chicago Telephone Co., has returned from a visit of four months in Europe and the East.

The Chicago Telephone Company is experimenting at their Stock Yards exchange with the metallic circuit, and it is proving a grand success. It has been decided to make it a permanent thing at that exchange, and it is the company's intention to use it eventually at the main office.

The Fort Wayne Electric Company have installed a very fine plant in the Adams Express Company's building for the Central Electric Light Company.

The plant at present has a capacity of 5,000 alternating lights and it is the intention of the company to furnish light to the entire block.

Hamilton, Corliss and Armington & Sims engines with an aggregate capacity of 400 horse-power furnish power for the dynamos.

The Central Electric Company.—This company was formed in this city a little over two years ago, by Messrs. W. H. and George A. McKinlock, two energetic young business men from Detroit, Mich. The growth of this company has been something remarkable, starting as they did on a small scale at No. 40 La Salle street. Soon after they found that business demanded a change, which was made, the company leasing the building now occupied by them at 42 La Salle street. Still the business increased, and recently the Messrs. McKinlock realized that larger quarters must be found. Accordingly they leased to-day the large building at 116 and 118 Franklyn street, between Washington and Madison, to which building they will remove about January 1st, 1890.

The building will be fitted up with all modern improvements, an electric light plant put in, and also motors for power in running elevators, fans, etc.

A novel scheme has been determined on in the way of a sign on the building which will represent the "Okonite" trade mark, consisting of a bank of incandescent lights. For this success and growth the management is to be congratulated—it is a clear case of merit winning. D. B. D.

Chicago, Nov. 16, '89.

OUR WASHINGTON LETTER.

The Eckington Road is laying a heavy bare copper wire between the tracks, with branches soldered to every rail. This is one of the useful things introduced by the Thomson-Houston Company since the Eckington road was constructed and it is expected to improve its working. The new Catholic University, which was dedicated on the 13th inst., is lighted by 600 incandescent lamps from the Eckington Thomson-Houston alternating plant. The 1,000-volt current is carried about two miles to transformers, located just inside the basement wall of the building where it is reduced to 52 volts.

The Greenfield System of Tubing placed in Vice-President Morton's large hotel has proved of great utility, inasmuch as it was found necessary to replace all the wires with other kinds of larger size and better insulation, and, without some means of drawing out and in, this would have been impossible.

Sprague Gets the Contract.—The Treasury Department has ordered a two horse-power electric motor to be used in driving machines for numbering and cancelling bank notes, bonds, etc. Bids for this motor were as follows:

R. B. Smith (Sprague motor)	$163
J. H. Bunnell	169
"C. & C." Electric Motor Co.	185
Excelsior Electric Co	187 50
Jos. U. Burket & Co. (Perret)	200
Thomson-Houston Co.	325
Eddy Electric Mfg. Co	250
Daft Electric Light Co	275

Horses will be so Cheap "Beggars May Ride."—The Brightwood Railway Company, which has been running horse cars since its opening six weeks ago, will make another attempt to obtain from Congress the right to operate an overhead electric system. It has never contemplated equipping the road with storage battery cars. The Judson Pneumatic Company has just concluded arrangements to make the Brightwood line the seat of operations for constructing the first practical working road under its system, and will lay a second parallel track one and one-eighth miles in length on which it is expected cars will be run by the pneumatic apparatus some time within a year. A technical description of the Judson system is too long to be given here. The car has a "grip" in the shape of a pair of legs which *straddle* a smooth, revolving cylinder, laid in a conduit between and parallel with the rails. The grip legs are arranged so that one will move forward on the cylinder while the other moves backward, and *vice versa*, and the revolving cylinder operates on them like an endless reversible screw of variable pitch, propelling the car in either direction and at any desired speed. The cylinder is revolved by small pneumatic engines, placed at intervals of about 1,000 feet along the conduit, operated by compressed air conveyed in pipes from a power house at the end of the line. This Brightwood road will cost between $75,000 and $100,000. The following statement of the comparative cost of operating is given:

By horse system	9.8	cents	per car	per mile.
By cable system	8.9	"	"	"
By Julien system	5.3	"	"	"
By Judson system	2.7	"	"	"

Still cheaper than any of the above mentioned systems, according to the statement of President Samuel M. Bryan, of the C. & P. Telephone Company, will be another street car motor which he is shortly to bring out. This is an invention of Wm. E. Prall, the originator of the heat and power system in use in Boston. In this system the cars are to be propelled by superheated steam generated in a coiled pipe boiler by the heat of a small naphtha burner, the boiler being supplied with water heated to 400° F. from a tank to be filled at the beginning of every four hours' trip. The Prall Tramway Motor Company is constructing a car at Jersey City. G. C. M.

Washington, D. C., Nov. 16, 1889.

OUR ST. LOUIS LETTER.

Electric Railways.—Much interest has been taken of late in electricity as a motive power. Three car lines have been experimenting with it preparatory to adopting it, and wires have already been strung across the bridge and a power house erected in East St. Louis to afford rapid transit between the two cities by the Sprague system.

Electric Lighting.—An ordinance providing for 400 more arc lights has been submitted to the municipal assembly, as the number decided upon for illuminating the city was found to be inadequate. If passed it will make an additional cost to the city of $30,000 per year. Light Inspector Matlack, in his report of the progress being accomplished in lighting the city by electricity, states that 9,069 poles are being put up and strung with the wires and lamps, and that the four 600 horse-power engines have arrived and will be placed in the power-house at once. Some difficulty has been experienced by the contractors in setting the poles and stringing the wires, owing to the obstacles the private electric telephone and telegraph companies have given them in respect to pole space and ground space. To facilitate them in their work, and in part to do away with this difficulty, the mayor has authorized the company to use all the poles owned by the city. Rumors that the company will not be prepared to light the city by 1890 have spread, but from the present outlook everything appears propitious.

A movement to illuminate Broadway extensively, in addition to the lamps accorded it by the city, is going on. The cost will be $15,000 per year, of which $12,000 have already been subscribed by merchants doing business on that thoroughfare.

Personal.—J. S. Ambrose, proprietor of an electric light plant at Springfield, Mo., is visiting the city.—H. H. Westinghouse, of Pittsburgh, one of the great firm of electric machine manufacturers, is spending a few days here.—J. F. Robinson, owner of the electric light plant at Eugene, Ore., is a late arrival. W. H. B.

St. Louis, Mo., Nov. 16.

OUR KANSAS CITY LETTER.

The Missouri and Kansas Telephone Company are rapidly extending their lines. A line completed from Witchita to Hutchinson last week will take in Wellington, Winfield, Newton and Arkansas City. It is expected to have a line completed to Sedalia by Jan. 1st. The company are now operating 50 toll stations with 1,600 miles of wire, and at the present writing have 2,539 subscribers in Kansas City alone.

Sales.—L. S. Jenkins, special agent of the Royal Electric Company, report the following sales within the past 10 days: Kansas City Desicating Company, 25 incandescent lights; C. H. Talmage, 10 horse-power motor.

Paul W Bossart, agent Western Electric Company, Chicago, closed a contract with the Manhattan Electric Light Company, Manhattan, Kan., to furnish and install 20 arc lights and 500 incandescent. Storage system will be used in connection, but the capacity of same has not yet been decided.

The Interstate Company.—Work is progressing rapidly on the new plant of the Interstate Company on West 5th street, and the company are in hopes to be able to fill the constant demand and standing orders for light in the near future.

KANSAS CITY, KANSAS.

The Consolidated Electric Light and Power Company are increasing the capacity of their model plant rapidly. During the past three weeks they have installed four 30-light arc machines of the Excelsior system, and one 750-light Westinghouse alternating machine. This will give the company a capacity of 300 arc lights and 1,500 incandescent. An Armington & Sims engine of 100 h. p. has been purchased and will be used to drive the Westinghouse alternating dynamos. The management of the company and the operation of the plant have changed slightly in the past 60 days. Mr. Freidburg is still retained as manager, and Mr. G. W. McCommon has been installed as superintendent and Mr. C. M. Griffin as electrician.

The Empire Electrical Construction Company has been incorporated under the laws of the State of Kansas, and have opened for business at 536 Minnesota avenue, in the Ryus Block. The following named gentlemen are the present officers: N. N. Webster, president; W. D. Burford, superintendent; T. R. Hayes, secretary and treasurer.

Kansas City, Nov. 13. W.

The bid of the Edison Illuminating Company, of Newport, R. I., which competed with the Newport Illuminating Company for the street light contract, was for 75 arc lights, Thomson-Houston system, 2,000 candle-power, 50 cents per light per night; for all additional up to 100, fifty cents; all additional over 100, forty-five cents; for 365 nights in the year two cents per night less, or 48 and 43 cents; for the interior incandescent lights by meter, one cent per hour for 16 candle-power, 1¾ cents for 32 candle-power.

Electric Light for China.

The Westinghouse Electric Company are rapidly extending their foreign business. We recently stated that a syndicate has intimated their intention to illuminate Canton, China, with the Westinghouse alternating system, and has placed an initial order for a 1,500 light plant. All the electrical apparatus, including dynamos, indicating, regulating and switching apparatus, converters, lamps, sockets, cut-outs, switches, etc., were shipped at one time from the large factories of the Westinghouse Electric Company, in Pittsburgh. The telegraphic order for these goods was received by way of San Francisco on the 5th of November, and the complete shipment was made on the 10th. Mr. W. R. Hitchcock, electrical engineer, well known in electrical circles, left his station in the East on the 13th inst., proceeding by way of Pittsburgh and San Francisco to take charge of the installation of this important plant.

GENERAL ELECTRICAL ITEMS.

The construction of the electric railway at Macon, Georgia, previously reported as having been granted a franchise, is progressing rapidly. At least two miles of wire is reported to have been hung.

The Adams, Mass., Electric Light Co. will begin next week to string wires for the incandescent lighting system. A new dynamo is expected soon, and the system will be in working order by Christmas.

At the Telephone—"Hello!" "Well, what is it?" "Who is that?" "Jones. Who are you?" "Me? Why don't you know me?" "Well, really, yes—I know your face, but I have such a poor recollection of names."—*Memphis Appeal.*

The Pennsylvania Telephone Company has accepted the ordinance adopted by Council and authorizing its erection of poles and wires at Chambersburg, Pa., and before Christmas the telephone exchange will be in operation there. The exchange when in operation will employ lady operators, who will be assisted by a messenger boy.

The annual meeting of the stockholders of the Oakland, Maine, Electric Light Company was held a few days ago. Major A. R. Small and E. M. Foster were re-elected president and treasurer, respectively, and H. W. Wells was elected a director and general manager, in place of F. E. Dustin, who is soon to leave the State.

The National Electric Company of Eau Claire, Wis., has received within the past week three orders for electric light plants: A 1,000 light plant at Hempstead Long Island; 750 lights at Three Rivers, Mich., and a 1,000 light plant at South Bend, Ind. Besides these a plant of 500 lights has been put in at Portage, and 750 lights at Goshen, Ind.

The Providence Construction Company, of Providence, R. I., has completed the work of wiring the new Providence Coal Company's pockets, which are the largest in the world, being capable of holding 30,000 tons of coal. The company has placed in the pockets more than 400 pounds of wire, covering about 8,000 feet, fixing for incandescent lights, the alternating current, 25 of them of 50 candle power and three smaller.

A rather novel comparison was recently made by Prof. L. J. Black, of Kansas University, at Lawrence, Kan. He compared the brightness of the light of the full moon with the arc lights of that city, by means of a suitable photometer. At a distance of 100 feet from the arc light he found its average brightness to be about 25 times that of the full moon. This means that if arc lights of the same brightness as those in Lawrence are placed at a distance of 50 feet above the earth, the brightness of their light, as seen from the base of the tower, will be about 100 times that of the full moon, or rather more than that if the arc light is viewed at the angle of greatest illumination. It also indicates that if arc lights of this brightness are placed 1,000 feet apart, at the point midway between them the brightness of the electric light will be equal to that of the full moon.

⁂ Reading, Pa., will soon become one of the "long distance cities," as soon as right of way can be obtained on certain streets.

⁂ Kansas City, Mo., will soon have telephone connection with Wichita, Kan. The Missouri and Kansas Telephone Company is building the line, which is nearly completed.

⁂ Thomas A. Edison has made a contract with the Mexican Government to furnish post offices with phonographs for transmission of messages. Majority of Mexicans cannot read or write.

⁂ J. R. Davis, J. K. Perry, of Dardanelle; W. W. Marlin, of Conway, Ark., and others, lately mentioned as contemplating building telephone lines, have organized the Arkansas Territorial Telephone Company. Mr. Perry is president. The company will commence work at once. The capital stock is $50,000.

⁂ The enemies of electricity are now getting their batteries in line to make the usual winter attack. During the summer when the little electric fans and the incandescent lamps are about the only things which make our homes, offices and places of amusement at all comfortable, they keep pretty quiet, but do a lot of thinking. Now, when the little fan is resting quietly on its shelf, gathering dust, they will proceed to bombard it with their small shot. It is a good deal like striking a man when he's down.

⁂ The French Government has issued new regulations for improving the telephone service which has recently been taken over by the State. A new scale of charges has been arranged as follows: For the use of a Post Office telephone cabin in Paris, 5d. for every five minutes; elsewhere, 2½d. The use of a telephone line between two towns is to be charged for at the rate of 8d. for every hundred miles and for every five minutes. Persons having telephones at their houses may use the long-distance lines at the same rates. No alteration is made in the charge for telephone messages between Paris on the one hand and Brussels, Lyons and Marseilles on the other, which remain at 3f., 2f. and 3f. respectively. Villages where no telegraph office exists may erect a telephone line at their expense connecting them with the nearest telegraph office and send and receive telegrams without extra charge.

⁂ It was in a grocer's place last Saturday morning that the propensity to growl was once more illustrated. Two gentlemen entered, one after the other, during the heaviest part of the heavy downpour of that day, and asked permission to use the grocer's telephone. The first man rang up "Central," then waited perhaps 60 seconds before he got a reply. He spent the interval in denouncing the system. "Confound telephones, any way," was one of his mildest remarks, and "They're more of a nuisance than a convenience," another. Finally, however, he got "Central's" attention, and in due time delivered his message. Then the other man took his place. There was even a longer delay this time, and when he had called up the man he wanted it was hard for him to hear his replies. Like his predecessor he was full of discontent. "If there's a storm," he said, "when a man wants to use the telephone it's sure to be working its poorest," and similar remarks. Yet the joint time of both men at the 'phone was barely five minutes, and one had told his physician that he needn't call after all, as his boy was all right, and the other had rung up an expressman to call for a trunk going out by the noon train, and both had borrowed the service from the company and a subscriber.—*N. Y. Sun*

From an Admirer of the Telephone.

AN ENTHUSIASTIC PENNSYLVANIA EDITOR VISITS NEW YORK AND IS IMPRESSED WITH THE TELEPHONE AND THINGS.

The telephone is always of interest, and never fails to supply its proportion of electrical news. Recent rapid advancement in the direction of long distance work, under the present progressive management, has made the telephone of fascinating interest, and the bright writers of the daily press have promptly made use of it.

A member of the staff of the Reading, Pa., *Herald*, recently investigated the telephone and other things in New York, and describes his visit and impressions in the following entertaining manner:

Hello!

It was a small, modest hello, about big enough to be heard across a small room. It was uttered up in the fifth story of skyscraping building in New York, and was spoken into a small vulcanized rubber funnel mounted on arm on an oak desk. That was all. But that Hello! took advantage of its opportunities and travelled. It went down through the desk, down through the floor into the basement of the building, then out into an underground conduit, rushing along under all the turmoil and rush of New York City, then up the Hudson, taking a squint at the Palisades, past Yonkers and Tarrytown and Sleepy Hollow, then out into the land of wooden netmegs, to and through New Haven, Hartford, Providence, Newport, on to Boston.

It crossed rivers and mountains, traversed the course of fertile valleys and past busy factories, noisy with the whirr of a thousand machines. It went through lonely forests, past places where they used to burn witches, and scenes familiar to the Pilgrim Fathers. It heard the music of the sea, it saw the homes of the rich and the poor and it caught a glimpse of Bunker Hill monument before it plumped into the city of baked beans and reached its destination in the ear drum of a man seated in a high building there.

It had travelled two hundred and fifty miles and it had accomplished the journey in the twinkling of an eye. In about one millionth of the time it takes to say Jack Robinson, it was there. It had turned a thousand curves, it had climbed up and slid down a hundred hills, and yet it came in at the finish fresh as a daisy on a dewy June morning. It was as if by a miracle the speaker had suddenly stretched his neck from New York to Boston and spoken gently into the listner's ear. It beat all to smash all the incantations of Merlin and the magii of old. It matched with sober truth the picturesque lies of Munchausen, Jules Verne or Haggard. In plain United States, it was the long distance telephone, one of the wonders of modern scientific attainment, and destined to work many new wonders in the near future.

As the long distance telephone service is about to be introduced into this city, a *Herald* man had gone to New York to investigate its workings, and after examining the plant and offices of the company, he held conversations with people of his acquaintance in Boston and Philadelphia with as much ease as if they were in the same room.

The headquarters of the long distance company are located in the big eight story building of the Metropolitan Telephone Company, at 18 Cortland street. This is the electrical center of New York, and the big building is full of marvels. It is the headquarters of the largest telephone exchange in the world, and counting all its connections, probably eight or ten millions of people can whisper into it over the great sheaves of wires that lead into it from all points of the compass. This building is crammed full of electricity from basement to roof, everything goes by electricity, and the hundreds of offices in it are occupied by people who deal in tame lightning or are engaged in the industries auxiliary to it.

The *Herald* investigator was first taken to the cellar under charge of Mr. Edward J. Meany, the Chicago manager of the Long Distance Company, and Mr. Francis J. Hovey, of New York, special agent of the same company. Here are located the dynamos which furnish light and power to the building. The current is not taken directly from the dynamos, but through the medium of a storage battery plant which is the largest in the world, and which stores enough electricity to light the building for several days if necessary. But the most interesting thing about the basement is the cables. These come in in great sheaves from the subways in all directions. There seem to be enough wires here to swing the great Brooklyn bridge, but every one of them has an individuality, since it goes to a subscriber, and the experts who are looking after them can at once locate any particular wire in the mass. While looking at them it seems impossible to believe that through them are all the time pulsing the voices of perhaps a thousand people from one end of Manhattan Island to the other.

From the basement the *Herald* investigator was taken to the operating room of the Long Distance Company on the fifth floor. Here was a switchboard, by means of which, in connection with another to be mentioned later on, the people in a region of country with Buffalo, Albany, Portland, Me., Scranton, Pa., and Washington, D. C., can talk with each other. There are some 12 operators, and they are constantly answering calls from all parts of the territory embraced within the radius given above. All the manufacturers of the towns of New England are constantly talking to their agents and correspondents in New York; Philadelphia call up Boston, or somebody down town wants to talk to Washington. You can call up Newport, Buffalo, or any one of half a hundred towns in the Eastern and Middle States. You can call up Benjamin Harrison and ask him what he thinks of Ohio, or ring John Wanamaker's bell and ask him for a post office. There are 17,000 telephone subscribers within a radius of 33 miles of New York, and any one of these can, through the mechanism in this room, have his wire connected with one of the long wires and then let her go for 500 miles, and it won't take him more than a minute or two either to find the man he is after if he is near the 'phone.

The switchboard upon which such wonders are worked communicate with the 9,000 New York subscribers through the great board in the operating room in the seventh floor, which is a marvel to all telephone men, as well as laymen. It is 400 feet long and extends around three sides of the building. All the space on the board in front of the operators looks like the lid of a pepper box. It is pierced with over 1,500,000 holes into which the plugs are put to make the connections between subscribers. From 90 to 100 girls sit in front of this chinning for all they are worth and speaking to more people in a day than the President shakes hands with at a reception. This room, with its millions of wires as well as all the electrical part of the business of the company, is in charge of Mr. J. J. Carty, one of the brightest and brainiest of the younger electricians of the country. He has a speaking acquaintance with every telephone wire in New York, and is constantly devising improvements in the service.

After leaving this room and its long row of pleasant-faced busy girls, the long distance 'phones were tested from Mr. Hovey's office, as stated above, and Boston and Philadelphia were talked with, with more satisfaction than in speaking between any two points in this city.

As is known, the company has now completed its long distance line as far as this city and will establish an office here as soon as the necessary permission is given to erect its lines through the city. There is also a line building to Easton and thence through Bethlehem, Allentown, Hazleton, Wilkesbarre, Pittston and Scranton. The line from Reading will connect with the latter.

The company makes connections with all the local exchanges in the cities through which it passes and will do so here, and will also open a pay station where people, whether telephone subscribers or not, can have the use of the wires. When this office is opened any one in Reading may call up and talk with people at their homes and in their offices in no less than 12 States, and when the line to Chicago is complete a half a dozen more will be added to the list. It is altogether possible that in less than two years nearly all the States east of the Mississippi may converse with each other. Mr. Meany says they have talked with ease over 700 miles of wire, and he has no doubt but that it is feasible to talk from ocean to ocean. The greatest difficulty now experienced is with underground circuits.

Wherever they are compelled to use these the service is marred in proportion to the distance that must be traversed. They have found this to result in every case where they are compelled to run cables for any distance. With these eliminated absolutely perfect service can be rendered to the remotest points. In erecting the long distance lines a complete metallic circuit is used. That is, there are two wires and no ground connection. The best No. 12 copper wire is used, and the absence of ground connection and the superior manner of construction prevents all extraneous noises and the cross talk and other annoyances, and which are so troublesome on ordinary lines. The company has profited by the experience in telephony of the last ten years, and it is able to furnish connections that stand the severest strain that lines have yet been put to.

After learning these facts, the *Herald* man enjoyed the hospitality of the New York Electric Club, on 22d street, which numbers among its members all the leading electricians of New York and vicinity. It occupies a handsome four-story brownstone house, and the wit of the men who assemble in its rooms is as sparkling and brilliant as the element which they have made their servant. A portrait of Thomas A. Edison, the vice-president of the Club, adorns the wall of the reception room, and the original of the picture often drops in to chin about lightning with the brainy men who assemble there to talk of and plan new marvels in electric science. Whether the cooking of the Club is done by electricity the *Herald* man did not inquire, but there was a magnetism about the viands and the table that could not be resisted.

Among those to whom the writer was indebted for special courtesies besides those mentioned were: Edward J. Hall, Jr., vice-president of the American Telegraph and Telephone Company; W. H. Fairbanks, general superintendent of construction; H. P. Marshal, assistant superintendent; C. J. Cutler, vice-president of the Metropolitan Telephone Company, and E. J. Hall, Sr., vice-president and general manager of the Bell Telephone Company, of Buffalo, N. Y.

A New Submarine Boat.

The "Goubet," the name of the boat built by a private firm at the expense of the State, says the Cologne *Gazette*, is a little boat 5.60 meters long and 1.53 meters broad. It can hold two men. The body of the craft is cast in bronze of a single piece, and can therefore bear a very high pressure. It is moved by electricity, which, in case of failure, can be replaced by oars. Completely armed, it weighs 6,000 kilogrammes (about 12,000 pounds) and can therefore be transported easily everywhere.

The electricity, as may be safely assumed, is obtained from accumulators in the boat; but it seems that this propelling force can also be transferred to the boat from land or from a ship accompanying the "Goubet" by means of a wire, which would naturally considerably hamper the movements of the submarine craft. The stores of compressed air are said to last for 24 hours and can, by an automatic arrangement, be so distributed that the state of the air in the ship is constant. The boat was immersed for eight hours at a depth of 10 meters, with two sailors in it, and these latter experienced not the slightest inconvenience during that period. As a special advantage it is claimed for the boat that it can at a word of command sink any depth, greatest probably 10 meters, remain there, and change its position at will. The sinking and rising in the water, it is said, can be executed with the greatest regularity, which is not the case apparently with the Spanish submarine boat "Peral" and the other French boat "Gymnote."

The Electric Railway.

We are in receipt of information showing that there are now in operation in the United States and Canada 102 electric railways, the total mileage of which is 552 miles, and the total number of motor cars 889. This shows an average of about 5½ miles and eight cars for each road. But the list referred to gives in detail the cities and towns in which all the roads are run, and the number of single track miles, and the cars employed in each. The following analysis of the list will furnish an interesting exhibit of the present situation of this important matter:

ROADS IN CITIES OVER 100,000 POPULATION.

	Miles.	*Cars.*
New York	18.5	10
Boston	14	31
Albany	15.5	16
Cincinnati	12	31
Cleveland	20	60
Louisville	10	10
Detroit	7.5	6
St Louis	5.5	12
Washington	3	10
Baltimore	2	4
New Orleans	—	1
	118	191

CITIES OVER 25,000 AND UNDER 100,000.

	Miles.	*Cars.*
Rochester	7	9
Syracuse	4	8
Troy	5	12
Columbus	2	2
Dayton	9	12
Nashville	3	6
Harrisburg	7.5	10
Lynn	6.8	9
Plymouth	4.5	3
Wilkesbarre	3	8
Wilmington	3	8
Omaha	26	72
Richmond	13	41
Wheeling	10	5
Erie	12	5
Reading	2	4
Scranton	20.5	37
Davenport	3.5	6
Des Moines	10	8
Salem, Mass	2	6
Atlanta	4.5	4
Allegheny	8.7	6
	162	281

The Testimonial to Monsieur Abdank-Abakanowicz.

The REVIEW recently announced that the above named gentleman had been honored by his American electrical freinds at the Paris Exposition. A copy of the Paris *Figaro* at hand contains the following account of the occasion, of which we publish a translation. The contributors to the testimonial and dinner were the following individuals and concerns of this country: American Bell Telephone Co., Boston; Commercial Cable Co., New York; Consolidated Subway Co., New York; T. A. Edison, Orange, N. J.; Electric Club, New York; Elektron Manufacturing Co., New York; Gardiner Time System Co., New York; Elisha Gray, Chicago; Heisler Electric Light Co., St. Louis; Okonite Co., New York; Sprague Electric Motor Co., New York; Thomson-Houston International Electric Co., Boston; Thomson International Electric Welding Co., Boston; Western Electric Co., Chicago.

The *Figaro* says: On the 24th October last the electrical exhibitors in the United States section invited Mr. Abdank-Abakanowicz to a dinner at the celebrated Café Durand, known to all good Americans as the café *par excellence* for *haute cuisine* and the most exquisite wines to be had in Paris. That both *Maître d' Hotel* and the *Chef* spread themselves in honor of their clients and their fellow countrymen may be imagined from a look over the *menu*, which, as a specimen of a well selected dinner, we here give in extenso. The *Menus* were beautifully gotten up in white and gold, with the names of the subscribers on one-half of the cover and the Abdank-Abakanowicz monogram and arms in relief also in gold on the other. The table groaned beneath the most beautiful exotics and *argenterie*, whilst the famous Sevres dinner service, once the property of a crowned head, and which is only brought out on ultra special occasions, was used. Covers were laid for 14 guests, amongst whom were invited General Martini of the French army, General W. B. Franklyn of the United States Army, Monsieur E. de Souberbeille, Mr. Boye of the French press, Mr. Haynie, correspondent of the Boston *Herald*, Mr. Carl Hering, and letters of apology were read from several other notables.

Mr. J. Draper Bishop presided, and he was most ably supported by J. F. Meech as vice-chairman, whilst Mr. E. Thurnauer, as chairman of the stewards committee, was responsible for the table arrangements.

The President first called on the guests to drink to the health of the Presidents of the two greatest republics, France and America, which was enthusiastically responded to. In proposing the health of Mr. Abdank, Mr. Bishop referred in brief but pointed terms to the able and enthusiastic way Professor Abdank had served the best interests of the United States, and the energy he had displayed in securing to the American exhibitors the awards they had received. Out of 13 grand *Prix*, four had been awarded to America. In the course of his speech, which was eloquent and to the point, Mr. Bishop said that he had been asked why invitations had not been issued to the officials of the United States Commission and the United States Legation? He said that this was by no means an oversight on the part of the committee. On the contrary, whilst admitting that the presence of United States officials would undoubtedly have added lustre to their efforts to honor Mr. Abdank-Abakanowicz, still it was decided that nothing should be done which might be considered as infringing on the prerogative, or which might diminish the prestige of any steps the United States Government might deem fit to take to signify their high appreciation of the services Mr. Abdank had rendered to the United States world of science, as represented at the Paris Exposition. There was no doubt that the United States Government, if it decided to do so, would do so in a manner worthy of so great a nation and the advanced position it held in electrical science.

He further remarked that it was the wish of the subscribers to this testimonial that it should be rather one of cordiality and good fellowship, and as a mark of personal esteem, than one of recognition of his official courtesy and tact, and that was another reason why the high representatives of France and America had been invited this evening personally and not officially.

He then read congratulatory telegrams from absent subscribers in America who had joined with those present this evening to do honor to their friend and guest whom they all esteemed as a man of fact rather than of eloquence. And as facts spoke louder than words, he would refrain from complimentary speeches and effusive praise, and ask Mr. Abdank to put his own interpretation on their presence here and their request that he would accept the testimonial which the vice-president, Mr. Meech, would now hand him, assuring Mr. Abdank that if he kept that testimonial until the donors forgot him that he would live to a good old age, and concluded by thanking in the names of those present, in the names of the companies they represented, and in the name of all Americans interested in electrical science, for the honest, manly and courteous cordiality which had characterized all his relations with those on whose behalf he was offered this testimonial.

The testimonial consisted of a very handsome silver coffee set, style Louis XV, with gold monograms and a Morrocco case on whose lid was engraved on a silver plate, "Souvenir. Paris Exposition. To Professor Abdank-Abakanowicz, from his Electrical Friends in the Industrial Section of the United States."

Mr. Abdank's reply was brief but full of emotion. He said that he was one of those independent characters who never did anything he did not find a pleasure in putting his energies into, and that if he had shown any virtues to merit such a reception and so handsome a testimonial, it was because he had to do with gentlemen whose acceptance of his endeavors and the cordial help he had received from them made his duties of the lightest and most agreeable. He had expected that he was to be invited to meet two or three of his American friends, although when he saw on the invitation of one of his friends the words: "Evening dress or uniform and decorations *de rigueur*," he had expected that he would have to make a speech, but the form the assemblage of friends had taken and the substantial testimony of their esteem which he had just received, were so utter a surprise that he could not find words to convey his feelings, and concluded a most eloquent speech by saying that in drinking back to them all, health, long life and happiness, his heart went with his words.

So much good feeling was invoked that it was with regret that the guests dispersed, most of those present being under engagement at one of those fetes which none so well know how to give as our French friends.

The service was manufactured by Baudot, of the Boulevard des Capucines, and is a beautiful specimen of French art.

Electrical News from St. Louis.

Our correspondent at St. Louis, Mo., writes that the Central Electric Construction Company has lately been purchased by the Edison Company, of New York, and will be run under the direct supervision of Leonard & Izard, of Chicago. The company has not yet appointed a resident manager. The following are the directors: H. Ward Leonard, New York; C. E. Chinnock, New York; A. H. Reece, St. Louis; C. C. Warren, Chicago.

The Southern Electrical Supply Company, of the same city, report business on the increase, and are unable to fill their orders for Okonite. The wonderful growth of this company since their opening is surprising to a certain degree, but is greatly due to their gentlemanly manner of doing business and their prompt shipment of goods.

The Opinion of an Esteemed Contemporary.

The *Breakfast Table* has received, and had placed on its exchange list, the ELECTRICAL REVIEW. This is an illustrated weekly journal of electric light, power, telephone, telegraph and scientific progress, published by the ELECTRICAL REVIEW Publishing Company, at No. 13 Park Row, New York City. It has a large circulation, and is a recognized authority on electrical matters. Its articles are carefully prepared and well written, while the illustrations are the best that money can procure and skill produce. In its field the REVIEW is equal to the well-known *Scientific American*, and everybody who is interested in electricity should read it every week.—*The Breakfast Table.*

A low-tension current search light on exhibition in Washington, has attracted some attention from members of the Maritime Conference. It is called the Huntington search light and consists of an automatic focusing lamp, fitted with a parabolic reflector and a combination of lenses, arranged to throw the light in a single narrow beam. A special advantage claimed for this lamp is that it can be placed on any steamer equipped with an ordinary incandescent plant and operated without the use of extra machinery. In this respect it is similar to the Kinsman arc lamp of New York.

At the Electric Club.

The meeting of the Electric Club, Thursday evening of this week, which occurs too late for a report in this issue, will be of interest to every member and of particular interest to the telephone fraternity. Mr. J. J. Carty, though a young man, has had years of experience in telephone work of an advanced order, and occupies a position of electrical importance in that field second to none. We predict that his paper will be a valuable and interesting contribution to telephone history.

A Reception.

Wednesday evening of this week the Magnetic Club, of this city, of which Mr. Chas. P. Bruch is president, gives a dinner to Mr. James D. Reid of the telegraph fraternity of New York, who has been appointed American Consul to Dunfermline, Scotland, for which place he will leave New York November 27th. The dinner is to be given by the Magnetic Club with the co-operation of the New York Telegraph Club, and to make the occasion one of unusual interest. Mr. Thos. T. Eckert, general manager Western Union Co., and Mr. A. B. Chandler, president Postal Telegraph Co., have kindly offered to send free of charge all messages which the old time telegraphers may wish to send from all parts of the country to Mr. Reid upon the occasion of this dinner.

The Westinghouse Exhibit at the Exposition Building, Pittsburgh.

For more than a week the Exposition Building in Pittsburgh has been open to the public with one of the most unique of electrical exhibits that has ever been seen in this country. Upon the occasion of the visit of the delegates to the Pan-American Congress in this city, a committee invited all local manufacturers to show their peculiar wares to the strangers, in order to give them an idea of the greatness of Pittsburgh as an industrial center.

To the Westinghouse Electric Company fell the part of furnishing the electric display, as the only electric company in that city, and how well the company acquitted itself can be best seen by a description of the exhibit.

The Westinghouse Electric Company occupied one-fourth of the entire building, and in this space some of the finest machines of modern electrical, as well as mechanical, invention were put up in a splendid array.

The Westinghouse rotary engine, a newly invented steam engine by Mr. Westinghouse, which never had been before the public gaze, was exhibited, and it is only just to say that this "debut" created a grand furor, not only among the visiting South Americans, but all local machinists and mechanics pronounced the machine to be a wonder. Next to this engine was a long line of alternating current machines from a 3,000 light dynamo to a motor generator, a 750 light machine down to a small 15 light puny machine. Above the exhibit was a large sign with a Spanish inscription composed of 800 incandescent lamps, the effect of which was very striking in the evening. A five horse-power alternating current Tesla motor was another feature of the exhibit, which operated a small printing press. On this press were souvenirs printed during the exhibition, and these cards, being printed in Spanish, were distributed among the guests.

A very handsome pavilion, magnificently decorated with exquisite flowers and very rare tropical exotics, stood in the center of the Westinghouse display. Chairs, lounges and sofas were placed all around the pavilion, and the visitors were invited to sit down and enjoy the grand sight at leisure.

It was originally decided to have the exhibition only open during the visit of the Pan-Americans, but on account of the splendor represented in the Westinghouse display, the Exposition Society has thrown the show open for another week to give the public an opportunity of seeing the wonderful display in the hall.

The United States Construction Company, of Philadelphia, P. A. B. Widener, president, has contracted to construct cable motor lines in Baltimore for the Traction Company of that city. The cost of the work is estimated at $3,000,000.

TELEGRAPHIC

.... The Western Union Telegraph Company will soon begin the erection of their call box system at Burlington, Vt., for the collection of telegrams. The boxes will be ornamental as well as convenient.

.... The Postal Telegraph Cable Company are erecting a new line from Buffalo, N. Y., via Lockport, Medina, Albion, Brockport, Rochester and Syracuse; thence to Elmira. The Lockport Common Council have granted the company the privilege to enter the city and erect their poles.

.... The Bell Telephone Company has practically secured the extension for two years of the contract for operating the city fire alarm system at Winnipeg, Can., which the aldermen were desirous the city itself should control. The price is reduced from $3,015 per year for 41 boxes to $2,400 for 50.

.... Since its enactment, 96 telegraph companies have accepted the provisions of the Act of Congress, approved July 24th, 1866, giving the Postmaster General the authority to establish rates for Government messages. Nearly all of these companies are now included in the great Western Union system, the officers of which now decline to accept the rates proposed to be allowed them by Postmaster General Wanamaker.

Suppression of Induction Effects Between Two Parallel Telephone Wires.

In the *Annales Télégraphiques* Mons. Massin describes a method which has been adopted in the Rheims network to suppress disturbances arising from the use of wires fastened to the same poles. Two places in the neighborhood of Rheims, Warmériville and Pontfaverger, are connected together by a wire, both of them being connected to Rheims. The subscribers of these two places do not correspond with each other, but solely with the Rheims network. When any subscriber of either group enters into conversation with Rheims, the other subscribers must wait their turn to use the line.

The natural solution of the difficulties arising from the proximity of the wires consisted in disconnecting, during conversation, the lines on which induction might be produced, so that subscribers during conversation of a fellow subscriber could not correspond, no matter whether their lines were cut out or not.

It is, however, not sufficient to disconnect the neighboring lines at the central station to prevent the overhearing of a conversation by outsiders; the lines have to be cut out at the subscribers' stations themselves.

For this purpose, calls with reversed currents have been installed at the subscribers' houses in Pontfaverger and Warmériville, by means of which the instruments can, in a state of rest, be placed "in bridge" on the call.

The polarized armature has the form of a reed oscillating between two contacts, 1 and 2; this reed is connected to line, while contact 2 is insulated from contact 1, which latter is connected to the subscriber's instrument. The positive current, which is used for calling the subscribers, places the reed against abutment screw No. 1, and maintains the shunt going to the call bell. A negative current, on the other hand, cuts the shunt going to the instrument, and consequently cuts the latter out of circuit.

The operations at the central station are therefore the following: On giving to one of the subscribers connection with Rheims, the operator attaches to the hook or hooks corresponding to neighboring lines, a key which draws from a special battery a negative current strong enough to actuate the call bells and to maintain the reeds apart from the abutment screws No. 1. These apparatus have now been in operation for 12 months, to the entire satisfaction of the subscribers, and have never given rise to any disturbances.

* * The Utica, N. Y., Belt Line Street Railway Company has selected the Thomson-Houston motor system for its lines.

* * With favorable weather, the Thomson-Houston people think they will have the Fourth avenue electric line of Minneapolis, Minn., in operation by December 1.

* * McKeesport, Pa., capitalists are contemplating the construction of a ten-mile electric street road to connect Dravosburg, Reynoldton and Duquesne with the borough at a cost of $150,000.

* * The Eastern Electric Cable Company, of Boston, is doing a very large business. The demands for insulated wire from the Thomson-Houston Company for the West End equipment is so taxing its capacity as to oblige it to refuse orders.

* * The Essex County Electric Light Company, which is furnishing electric arc lights in Orange and West Orange, has purchased the plant of the Heisler electric light system, which supplies the incandescent lights. The Essex Company will now control all the electric lighting in Orange, N.J.

Electrical Power for Des Moines.

A number of gentlemen have formed a company to be known as the Des Moines (Iowa) Water Power Company. The prime object of the association is to utilize the water power across the Des Moines river, for the purpose of generating electric currents. They have a proprietary interest in the dam and mill property at the foot of Chestnut street, and claim that there is 1,000 horse-power there, now ready to be utilized. This of itself will generate a large amount of electricity, but to render the works operative under all circumstances, it is proposed to reinforce the water-power with engines to be used in case of emergency. It is in a central location of the city, and there is ample room for an immense factory building, planned to accommodate any sized factory from one room up to as many as required. The electricity can, however, be wired to wherever needed. The present electric light works have all they can do to take care of the lighting demanded by customers, and have little to spare for factories. This company will fill the void and furnish power, at reasonable rates, to any factory located within a reasonable limit. In other words, the company proposes to develop and improve the water power across the Des Moines river, and render it more useful and of greater advantage to the city and its inhabitants.

In casting about for a suitable secretary and manager, the company has been fortunate in securing the services of Mr. C. K. Mead, for seven years manager of the telephone exchange. Mr. Mead needs no commendation, says the Iowa *State Register*. He is well known throughout the city as an accomplished gentleman and faithful representative of the telephone company. For seven years he has managed with marked ability this large exchange, has been in the employment of the company ten years, and previous to coming here, superintended the building of exchanges at Dubuque, Iowa, Freeport and Rockford, Ill. He has had fifteen years' experience, all told, as an electrician, and will bring this ripe experience to bear upon his new duties. He will assume the new position as soon as a suitable person is found to take his place with the telephone company, his resignation having been reluctantly accepted. His greatest regret is that during the past six months thousands of dollars have been expended by the telephone company in this city in re-equipping the system, and just as it is about completed, and every subscriber will have a new wire, he has to turn it over to his successor.

The Patten System of Electric Distribution.

We give in this issue an outline of a new system of distribution of electricity which is being developed, and deserves consideration for its novelty.

The system consists in a device which lies between the direct and alternating current systems familiar to our readers, and has apparently some of the advantages of both.

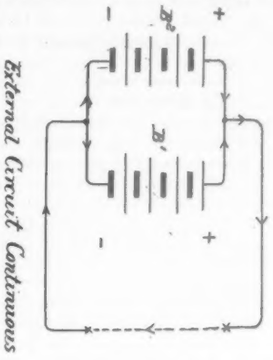


Figure 1.

Direct Current Systems.

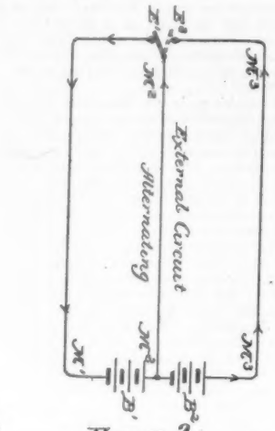


Figure 2.

Alternating Current Systems.

It consists in a means of using the alternating current normally generated in a dynamo at a distant point, as a direct or alternating current at pleasure, and presents an arrangement of devices for using an ordinary current generator, and sending the immediately induced currents to line in such a way that they can be used either as direct or alternating currents, according to the requirements of the case. The system will be understood from the diagrams given. In Fig. 1 is presented the batteries B^1 and B^2, which may be considered to represent any ordinary direct current dynamo in which the current flows continuously from one pole to the other, as shown. It is the case of batteries in multiple arc, the circuit being taken from their common terminals of like sign, in which case current will not flow except through some external circuit like the one shown in the Fig. 1, and this illustration may be regarded as a symbolical representation of the direct current dynamo, from the two brushes of which always flows a current of continuous direction through the circuit M^3.

Fig. 2 is another case; the same battery is split in the middle, and its two terminals are connected to a separate circuit. The middle circuit ends in a vibrator, which moves between the point E^1 and E^2, and this middle circuit M^3 has a continuously reversed current as the vibrator at its extremity moves between the contact points; it is therefore apparent that the circuit M^3 returning to the battery at its middle point will carry both the currents coming to it alternately from the circuit M^1 and M^2, connected to the poles of the battery B^1 B^2. The circuit M^3 conveys an alternating or reversed current (supposing the vibrator in motion), while the circuit M^3 in Fig. 1 can carry none but a direct current.

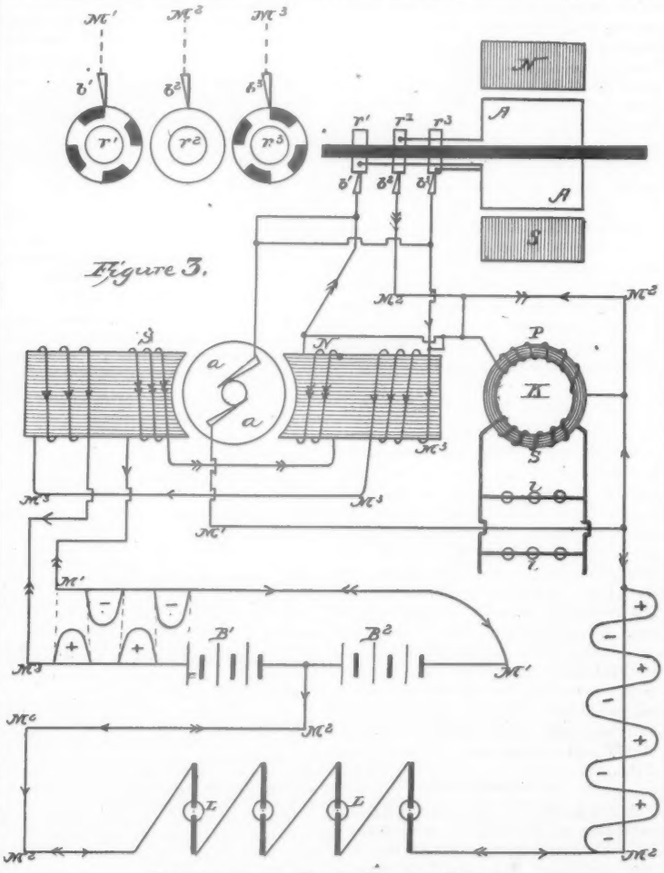


Figure 3.

Diagrams of the Patten Electric System.

One of these Figs., No. 1, represents the direct current dynamo, and a single circuit or two wire system of distribution, the other, Fig. 2, represents the alternating current dynamo, and a new three wire system of distribution. It is not necessary to follow the analogy further, as it is evident the two systems are simply different methods of using a source of electro-motive force, and it can be further shown that by changing the system of circuits we have not changed the possibilities of the power at work. The alternating and direct current systems being simply modifications of the cases presented, are each equally capable of all the possible uses of the electro-motive force at work, whether applying to power or light, or any similar use of current.

In Fig. 3, is shown the complete mechanical analogy of the case presented in Fig. 2. Here is shown the ordinary generator, with fields N and S, and armature A, its circuit being connected one end to a middle ring r^2, and the other to two rings r^1 and r^3, each of which in turn has contact with its own circuit, M^1 and M^2, through brushes, b^1 and b^2, as shown to the left in the diagram; thus we have in this machine the mechanical equivalent of the operative parts, illustrated in Fig. 2; the ring r^2 collects the alternating current at all times, while the rings r^1 and r^3 give to their corresponding leads, M^1 and M^2, the positive and negative impulses respectively of the same current, as they are produced in the armature circuit by its revolution between the fields. We thus have on the circuit M^3 a true alternating current, while on both M^1 and M^2 we have a direct current, and these three circuits may evidently be used to perform all the functions of both alternating and direct currents; thus at K we have a converter through the primary, P, of which flows a true alternating current, and, therefore, from its secondary, S, flows a true alternating current of low tension feeding the lamps l. The other two mains, M^1 and M^2, carry intermittent impulses of opposite direction, but not coincident in time, therefore by winding these circuits inversely around a field, as shown at N and S, we can produce a constant polarity of iron by means of an alternating current, and thus obtain a constant magnetic field, S and N, in which an armature having either an alternating current or a direct one can be made to revolve and do work.

These main circuits may be also taken to batteries or other sources of counter E. M. F. like those shown; thus the storage battery may be charged with an alternating current by connecting the main, M^3, which carries the alternating current to the middle of the battery, the other two mains, M^1 and M^2, being connected to the opposite poles, each half of the battery being charged by each successive impulse in turn, all impulses returning through the common middle circuit, M^3, and from this source of stored energy any devices requiring direct currents can be supplied.

It is further evident that arc lights may be put in series or otherwise in the circuit M, while their regulating circuits may be included in the sides, M^1 and M^2, by which, as before shown, by a suitable combination of windings, the direct magnetization of iron may be produced and the lamps or other devices requiring electro-magnets may be controlled.

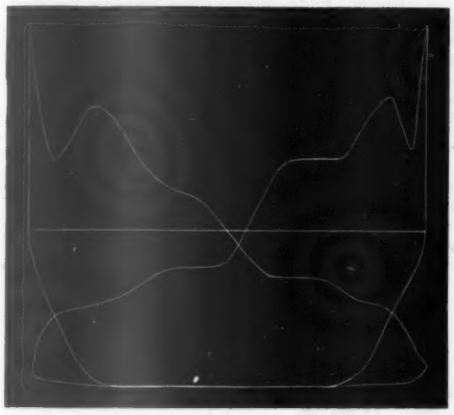
We thus see that a divided current as that indicated in Fig. 2, or an alternating current as that produced mechanically by the devices shown in Fig. 3, may be used to perform all the functions that can be performed by that produced by a system like that illustrated in Fig. 1, the former having an alternating current at a distance from the source of generation as well as a direct current. All possible applications of electric energy either for power or light becomes possible with a system which is neither direct or alternating in character, and renders possible the use of motors without commutators at any distance from the central station at which the alternating current can be supplied, which latter subject will be treated in a later article.

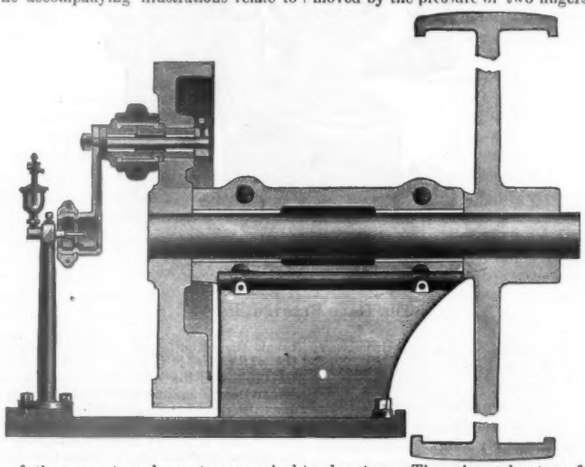
Four companies have been chartered thus far to furnish Dubuque, Iowa, with electric light.

The Rice Automatic Tandem Compound Condensing Engine.

Wherever water can be obtained free in sufficient quantity it has come to pass that the compound condensing engine is looked upon as a positive necessity for the economical production of power. People are demanding more light, and they insist that it shall be cheap. Competitors for their patronage are forced by the pressure of competition to seek that system which will most economically yet efficiently serve its purpose, and in the face of this fact the more wasteful system and machine must go to the wall.

The accompanying illustrations relate to one of the newest and most economical types of compound engines. It is built by the John T. Noye Manufacturing Company, Buffalo, N. Y., under the patents of F. B. Rice, the well-known engineer, whose name it bears. This engine is built tandem, or, as marine men would say, "steeple form;" the latter being their term for vertical engines.



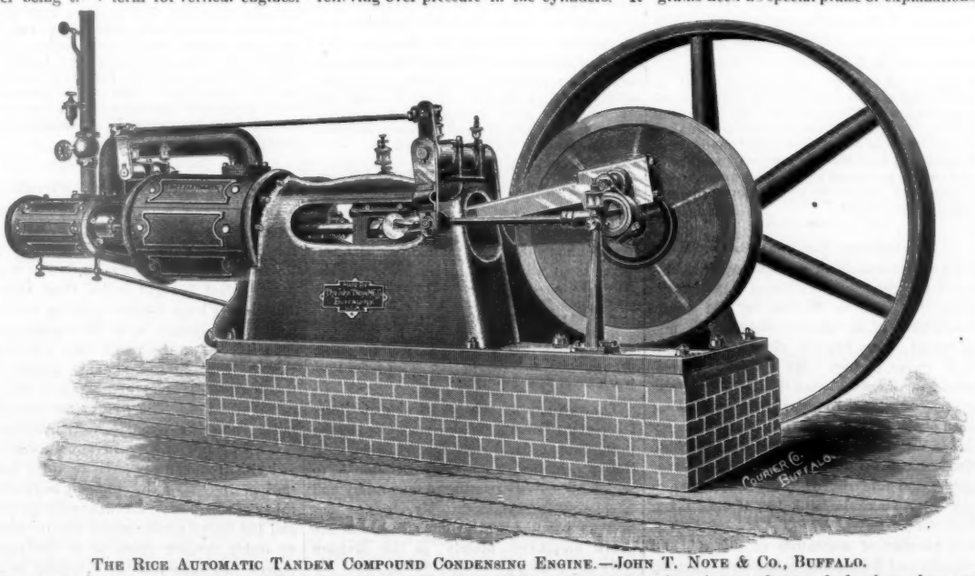


The governor is inside the crank-disk, as may be seen by a glance at the back view represented herewith. Both high and low pressure valve are operated automatically by the governor.

One may get from the engraving a very clear idea of the connections in the valve motion. Either valve can be set independently of the other, while the engine is in motion. The valve itself is an ordinary four-part or gridiron valve. It is perfectly balanced from all pressure higher than the exhaust. To illustrate, it is stated that, with a full head of steam on, both valves can be moved by the pressure of two fingers on the valve stem. The valves take steam from the inside, so that they can be operated with the chest cover off if it is desired to ascertain whether they are tight.

The pressure plate, shown in the sectional view, is covered by Mr. Rice's patents, and forms a valve for the escape of water and for relieving over-pressure in the cylinders. It does not rest on the valve, as some might imagine from the illustration, but is supported by the two scraping shoulders on each side of the valve.

The lubrication of this engine has been made as nearly perfect as possible. Every oil cup is stationary, with sight feed and adjustable cut-off.



THE RICE AUTOMATIC TANDEM COMPOUND CONDENSING ENGINE.—JOHN T. NOYE & CO., BUFFALO.

The engraving does not show the piping and connections below the cylinder; but these are hardly necessary to this description.

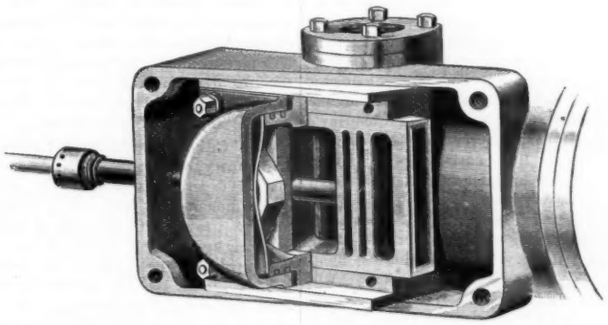
The frame is of the same form as that used for standard Rice engines, and can be made self-contained or with an outside bearing, to suit special local requirements.

An independent pump and condenser, or a power condenser connecting direct with the engine shaft, can be used, as the purchaser may prefer. In all the plants thus far installed by the John T. Noye Manufacturing Company, the Worthington independent condenser has been used, and has given the best of satisfaction, both to the user and to this company.

The compactness, smooth running, and thorough economy of this engine should strongly commend it to all electric light companies. Being of few and simple parts, it is durable and easily managed. Hitherto it has been used almost wholly for electric light plants, the demand in that field being so great, but its points of superiority make it also highly desirable for general use in mills and factories.

Engines of the style we have illustrated are built of 50, 75 and 100 horse-power. For larger sizes a different form of bed in used—a bed that is lower and heavier, while the governor is placed in a separate case outside the disk. The pair of indicator diagrams shown were taken from an engine of 100 horse-power, the cylinders being 9x16 and 16x16; speed, 260 revolutions. These diagrams need no special praise or explanations, since they speak strongly for themselves, and indicate to the trained eye the excellence of the valve motion.

Electricians, engineers, and others who may wish to inquire further about engines built by the Noye Company are cordially invited to write or visit them, when full information will be gladly furnished.



ELECTRIC LIGHT NEWS

—— Swanton, Vt., will soon introduce electricity for street lighting.

—— The El Paso, Tex., Electric Company has increased its capital stock from $100,000 to $250,000.

—— The building of the Albion, N. Y., Electric Light Company is nearly completed. It will be a handsome and substantial structure.

—— The Thomson-Houston Company have substantially completed arrangements for supplying Middlebury, Vt., with electric lights.

—— The Thomson-Houston Electric Welding Company, of Boston, Mass., is reported as arranging to erect a plant at East Chattanooga, Tenn., to cost $1,000,000.

—— The Fort Wayne Electric Light Company have commenced excavations for an additional building, 80x30 feet, for their works at Fort Wayne, Ind. It is to be used as a brass foundry.

—— The energy of the Texas representative of the Westinghouse Electric Company is well-known in that section, and resulted last week in the closing of a 750-light alternating order from parties in Eagle Pass.

—— The Amoskeag mills at Manchester, N. H., will increase their present electric light plant by a 900-light dynamo, which will be supplied with an automatic regulator. The mills will then be lighted by 1,500 lights.

—— After a severe competition the Westinghouse Electric Company sold to the Tacoma Light and Water Company, Tacoma, Wash., a 750-light alternating plant. It is proposed to extend this plant to 3,000 lights at an early day.

—— The contract for furnishing the electric towers for Allegheny, Pa., is closed between the Westinghouse Company and the Star Iron Tower Company, of Fort Wayne, Ind. The contract calls for the completion of all the material in 90 days.

—— The Wheeling, W. Va., Electric Light Company have put in new boilers and will also add another dynamo. This company now expects to do a good business. There certainly should be a demand for the electric light in a city of the size of Wheeling.

—— The satisfactory operation of the initial plant installed for the Newark Electric Light and Power Company, Newark, N. J., has resulted in the second increase of alternating plant this month. They have now 2,250 lights, Westinghouse alternating in operation.

—— Last spring the Butte Electric Light Co., Butte, Montana, placed an order with the Westinghouse Electric Co. for a 750-light alternating dynamo. The satisfactory operation of the initial installation has resulted in a telegraphic order to the western agent of the Westinghouse Electric Company for a duplicate of the original plant.

KINDRED INTERESTS

The Leclanche Battery Company.—This leading battery house has received the distinction of being awarded the gold medal at the Paris Exposition, the only medal, we believe, that was awarded primary batteries. This battery is one of the oldest and best known, and its popularity is ever extending.

The New Haven Clock Company.—This company has just issued an attractive illustrated catalogue with colored cover of handsome design, describing in full the various apparatus contained in their electrical department. We have also received together with the catalogue a complete price list of their electrical goods.

Burlington Route to the West, Northwest and Southwest. — No other railroad has through car lines of its own from Chicago, Peoria and St. Louis to St. Paul and Minneapolis, to Council Bluffs and Omaha, to Denver and Cheyenne and to Kansas City and St. Joseph. Tickets via the Burlington route can be obtained of any ticket agent of its own or connecting lines. Electrical travelers who take the Burlington route are always satisfied.

The Pond Engineering Company is furnishing the Holden, Mo., water works with a 50 horse power Armington & Sims engine for running an electric light plant, and the Thomson-Houston Company of Omaha with a 14-inch grease extractor with oil cylinder complete. Two of the largest size Pond Engineering Company's feed pumps and receivers have been shipped to Normal, Ill. Their sales of Ireson leather link belting, Sheffield grate bars, etc., have been very large.

The Pond Engineering Company are also contracting engineers for the steam plant at the new Thomson-Houston lighting station at Joliet, Ill. They will furnish and erect three 100 horse-power boilers, one 250 horse-power Lane & Bodley Corliss engine, Hoppes live steam purifier, Lowe heater pump, injector, etc. They will also furnish the San Diego, Cal., cable railway with four 90 horse-power boilers, and the Palmetto Brewing Company, Charleston, S. C., with a 100 horse-power Lowe heater.

The Eddy Electric Motor, manufactured by the Eddy Electric Manufacturing Company, of Windsor, Conn., which has been on the market a little more than a year, has met with flattering success, and the fact that their large and complete works are in constant operation from 7 A. M. to 9.30 P. M. is conclusive evidence of the popularity of this motor. The company are in receipt of many letters concerning the excellence and economy of their motors, and wherever they have been installed they have given perfect satisfaction. For operating elevators, printing offices and wherever economy, safety and cleanness and saving of time is desired, this motor, which is manufactured of from ½ horse power up, will find a standing. Among the recent installations, the following may be mentioned: P. P. Emory & Co., copper smiths, Springfield, Mass., one 15 horse power motor; W. W. Walker, Hartford Conn., Boston Branch, tea and grocery house, ½ horse power to operate cash carrier, one horse power two coffee mills, three horse power for running freight elevator; E. Tucker Sons, Hartford, Conn., paper warehouse, two horse power motor for operating freight elevator; Hartford Trust Building, five horse power motor for passenger elevator; Stoddard, Kimberly & Co., wholesale grocers at New Haven, ten horse power motor for freight elevator. The elevators at Lafayette & Vanderbank's Hotel at New Orleans, La., are also operated by this motor.

The Elektron Manufacturing Company.—This company, though recently a severe sufferer from fire, has promptly secured other and improved quarters at 79 and 81 Washington street, Brooklyn, and will soon be able to turn out the Perret electric motors in larger quantities then ever before. The present location is but one block from the end of the Brooklyn bridge and is therefore very convenient to New York City. It will be remembered that the Perret motor received the gold medal at the Paris Exposition.

William Macfarlane & Company, 55 Mercer street, New York, recently led us through their factory where we were shown the largest assortment of silks, different sizes and qualities that we have ever seen in stock at one time. The silks were on braider spools all ready for the machines of the large manufacturers of covered wire, such as the Western Electric Company, American Electrical Works, Detroit Electrical Works and others. It seems that Macfarlane & Co. give their customers 16 ounces to the pound instead of 12. The quality of their silk, judging from the many letters of commendation they have received, is certainly of the best.

The Easton Electric Company, of 45 Broadway, has just concluded a contract with the city of Rockland, Me., by the terms of which the company is to light the streets of that city for a period of five years. The Easton Company has been recently reorganized, and its present officers are president, P. Minturn Smith; vice-president, Wm. D. Perry; secretary, G. G. Frelinghuysen; treasurer, Charles Tremaine; electrician, James W. Easton. The new management is putting a great deal of energy into the business. The Easton system will bear investigation. Its management claim that the dynamos and lamps are the best proportioned, electrically, and the simplest, mechanically, of any thus far devised.

The Carolina Oil and Creosote Company, of Wilmington, N. C., are now making experiments to show the relative evaporation of light bodies from creosoted material treated with dead oil of coal tar and their heavy wood-creosote oil, etc., and are surprised at the results so far obtained in respect to the very low rate of evaporation from their material as compared with that of dead oil, which also varies greatly with the different samples of dead oil used. In a recent letter they state: "We noticed an interesting discussion which states the results of experience with dead-oil-treated material for underground conduits, showing the evaporation of the phenols and their effect upon lead sheathed cables. We aim to eliminate all the soluble and volatile bodies from our oil before injecting into wood, and think that in this respect 10 lbs. of our heavy wood-creosote oil is fully equal, in creosoting efficiency, to 12 or more lbs. of dead oil ordinarily employed. We have been sparing no pains to so improve the quality of our creosote oil and creosoted material as to gain and hold the confidence of engineers and others in regard to the value and honesty of our work, which we now believe to be unequalled anywhere."

Interstate National Bank.

The Interstate National Bank, with a capital of $200,000, was established at 167 Broadway, this city, on Monday of last week. The officers of the bank are Robt. H. Weems, president; John Francis, vice-president, and F. F. Stone, cashier. Mr. Francis, the vice-president, is well known to a number of the readers of the ELECTRICAL REVIEW, having been at the head of electric railway property in the West. He was for several terms State Treasurer of Kansas, and is a financier of ability and integrity who will be welcome in this city, where the bank has at once taken high rank.

A number of capitalists of this city and vicinity and Kansas are interested. Among the latter are Hon. A. H. Horton, Chief Justice Kansas Supreme Court; Hon. Thos. A. Osborn, ex-Governor of Kansas; Hon. C. J. Brown, Clerk Kansas Supreme Court, and Hon. J. G. Slonecker, of Topeka, Kan., the last named gentleman being one of the directors of the bank.

PERSONAL.

Mr. W. M. Talcott, general manager of the Western Light and Power Company, Chicago, visited New York last week. Mr. Talcott is one of the rising young electrical men of the west.

Rev. William Hall, one of the oldest Presbyterian ministers in New York, died in this city Sunday of last week, after a few days illness. Rev. Dr. Hall was the father of Mr. H. D. Hall, who is well known to the electrical fraternity.

Mr. H. E. Webb, of the Solar Carbon and Manufacturing Company, Pittsburgh, is visiting in New York, where he finds the carbon business quite lively. The Solar Company, in addition to a large electric light trade, manufactures very largely for the battery trade.

Chas. H. Davis, C. E., 120 Broadway, consulting electrical engineer, has found the electrical industry so productive a work that he has been compelled to open a Philadelphia office at 308 Walnut street. Mr. Davis is a thoroughly competent and reliable engineer and has had much experience in electrical work, and abundantly deserves the success he is meeting with in this field.

Mr. T. W. Sprague, for a long time the representative of the REVIEW at Boston, has accepted a responsible position in the mining department of the Thomson-Houston Company—a work that his abilities and inclinations particularly fit him for. Mr. Sprague has the best wishes of the REVIEW, which he represented faithfully and intelligently, and in his new field of work will undoubtedly meet with a full measure of success. Mr. Stephen L. Coles succeeds Mr. Sprague on the REVIEW staff.

Mr. Geo. F. Porter has severed his connection with the Faraday Carbon Company, of Pittsburgh, and will hereafter devote himself to advancing the interests of the Westinghouse Electric Company, with headquarters at Philadelphia reporting to the New York office. Mr. Porter has the respect and confidence of every man in the electrical field who knows him. He is a gentleman of ability, industry and integrity, and the REVIEW expects to see him win a pronounced success in the wider field of work he is now entering.

The vacancy in the electrical examining force of the Patent Office has been filled by the promotion of Mr. Gustav Bissing to the position of principal examiner of Division A, to which all matters relating to telegraphy and telephony are assigned. Mr. Bissing has been an examiner in the office for about five years, employed mainly in the division having charge of metal-working, etc. He is a graduate of Johns Hopkins University, a man of unusually good education and will make a very efficient officer in his new position. Mr. A. P. Knight, an assistant examiner in the Electrical Division, has resigned to engage in private business. He is a brother of Mr. Knight, of the firm of Bentley & Knight, the electric railway inventors.

The Hall Electric Pump.

The application of electricity for pumping purposes is indicated in the accompanying illustration of the Hall electric pump. The Hall Company, after nearly two years of experiment and test, are satisfied that this pump is practical and reliable. It has recently been adopted by the Edison Electric Illuminating Company, of New York, and bids fair to come into general use. It is manufactured by the Hall Company, at Plainfield, N. J., and among the claims they present for it we publish the following: It is automatic in its action and always keeps the tank full without requiring attention or the services of an attendant, the action being as follows: There is placed at the tank and in the electric circuit a switch or cut-out, which is operated by the action of a float as it rises and falls with the water; for instance, when the tank is filled to the desired height, the float acts to cause the switch to break the circuit and stop the pump until the water level is lowered by drawing from the tank, and the float descends and causes the switch to again complete the circuit and start the pump and again fill the tank, when it will be stopped until more water is drawn out. This is a very important feature, as it is extremely gratifying to know that there is always a supply of water ready for immediate use without the constant daily attention required of other pumping machines. These pumps are said to be cheaper in first cost; cheaper to run; cheaper to maintain; noiseless; clean; perfectly safe; no explosions; always ready; does not get out of order; no coal; no ashes; no dust or dirt; no gases; no offensive odors, and requires little or no attention, it being only necessary to refill the oil cups about once in two weeks. These pumps are particularly adapted to furnishing water for domestic use, for office buildings, for fire protection—especially in connection with automatic sprinklers, as it can be arranged to start instantly by automatic devices—and for many other purposes.

THE HALL ELECTRIC LAMP.

A Long Electric Light Circuit.

One of the longest incandescent light circuits in existence has been erected by the Illinois Valley Electric Light and Power Company, Ottawa, Ill. The water power plant is eight miles from Ottawa. The Heisler long distance lighting system is used. The dynamo is of 700 candle-power capacity. For the trunk line wire No. 8 B. & S. gauge is used, hard drawn and weather proof. The total length of the circuit is 45 miles. The first lights are eight miles from the dynamo and lights at the farthest point from the generator are said to be as brilliant and steady as those in the power station. In Ottawa the company has now 300 thirty candle-power, 15 twenty candle power and 100 fifteen candle-power lights, besides 20 lights ranging from 40 to 100 candle-power. In Marseilles the company is now running 15 thirty candle-power, 15 twenty candle-power and 20 fifteen candle-power lights, and it is expected soon to supply the city with 15 street lights and also to secure a contract for street lights in Ottawa. A circuit will also be put in at Seneca five miles east of Marseilles.

The D'Humy Water Battery.

It is now something over a year since much has been seen in the columns of the electrical press in regard to the device named in the heading of this article, though readers of the English electrical papers will undoubtedly recall the racy treatment which M. D'Humy and his battery received in the London electrical papers.

The "combination" has made its appearance in New York, and has started on its career in the good old way amid the popping of champagne corks, the tinkling of glasses and the perfume of choice cigars.

The REVIEW received a courteous invitation to be represented at a private exhibition of the battery on Monday evening, at 26 Lafayette place. Nearly all the daily papers were represented, and the 20 or 30 gentlemen present witnessed an exhibition of quite a number of incandescent lamps run from an accumulator charged from the D'Humy primary battery. There were a few Sawyer-Man and Edison 16 candle-power lamps, but the majority of them were very small, and appeared to be about five candle-power, if nominally run, but they were forced up to 20 and even 50 candle-power, and made a magnificent display, which was heightened by the very artistic shades and floral effects with which they were surrounded. M. D'Humy stated that these lamps were his own invention and were not exhausted, but were filled with a gas which would not support the combustion of the filament. He furthermore stated that this gas had the peculiar property of building up weak spots in the filament; upon being asked if the gas was a hydrocarbon, he declined to answer. The lamps had the appearance of being operated at a temperature that would reduce their life far below that of ordinary commercial lamps.

The accumulators which fed the lamps were said to be peculiar in construction, were the invention of an American, whose name was not stated, and were owned by the company. They were completely enclosed in wooden boxes, and no information was vouchsafed in regard to them. The primary batteries which charged the accumulators were encased in a cabinet which resembled a large upright piano, and were so arranged that the positive plates could be simultaneously removed from the exciting fluid with but little effort, and the mechanical construction of the battery and the enclosing cabinet was excellent. The positive plates were said to be made of an alloy of which it was claimed that mercury was one component, and after a hasty examination the REVIEW reporter is willing to wager his winter boots that zinc was another component. It was claimed that the composition of this alloy was a very important discovery and that the plates (about ⅜ inch in thickness) would last in ordinary service about two years. The positive plates were immersed in flat porous cups filled with water; the outer jar in which were placed the carbon plates were filled with the depolarizing fluid, some of which flowed through the porous cup and acidulated the water in which the alloy plates were placed.

No voltmeters or ammeters were shown, and the exhibit really resolved itself into a display of a number of incandescent lamps run from an accumulator which was being charged by a primary battery. At what degree of economy the primary battery was working, there was no way of finding out, nor was there any attempt at demonstration.

Immediately after the display a very elegant little supper was served in an adjoining restaurant, and the representatives of the daily papers waxed quite enthusiastic under its generous influence. This enthusiasm was evidently not shared by the city editors of the aforesaid papers, for the several pages of type-written copy which was handed to each reporter failed to "get there."

This enterprise seems to be backed by men who have the courage of their convictions, for it was stated that the corporation was prepared to give a satisfactory guarantee of the performance of the battery for isolated electric lighting.

It would be a very simple matter to publicly demonstrate the cost of liberating electric energy by acting upon the secret alloy with any given acid, and such a demonstration should be made before recognition among electrical people is expected. The company should also avoid the use of exaggerated claims for the battery, which will only cause prejudice among conservative people. The type-written copy handed to the representative of the REVIEW contained the following expressions: "The cost of the production of the light obtained by this invention hardly equals the price of gas in England, and is a great deal cheaper than the French gas or the American gas." "The object of this exhibition was to prove that an important question had been solved, that is to say, the entire disparition of the wire and cable, either aerial or underground, consequently reducing the percentage of loss of life resulting from contact with high tension electric wires." It is, of course, needless to comment upon such statements.

The Course in Electrical Engineering at Princeton.

President Patton of Princeton, in his report, says: "The number of students is considerably increased, there being 758, as against 676 last year. Since the last meeting the college has been provided with ample equipment for the department of electrical engineering, concerning which Prof. Brackett makes report and recommendation substantially as follows: Two buildings have been built—a magnetic conservatory and a dynamo building—connected by large copper conductors, so that they are mutually supplementary. These buildings are supplied with all the necessary instruments and suitable devices for the most advanced and accurate scientific work in electricity. The course of study embraces: First, theory of electricity and magnetism mathematically presented; second, practical course in electrical measurements; third, technical course in applications of electricity. The course as sketched will occupy for a man of fair knowledge of mathematics and physics two years. It was recommended by the trustees that the degree of electrical engineer be granted to students following out the course. Revisions have been made in the curriculum of the John C. Green school of science to allow for the change made in the division of the collegiate year, and for several essential changes, all tending to elevate and liberalize scientific work."

Electricity in Mining.

The Taylor and Brunton Sampling Works, of Colorado, running on boulder (lease) ores, are now running a 20 horse-power Sprague electric motor in their works with very gratifying results. Ten horse-power is all that is required to drive the machinery, with ten horse-power to use for other purposes. The motor is doing the work with the greatest ease, running smoothly, with no jarring or hitching. Electricity is being used in quite a number of mining plants throughout the country, and all who have used the motors have spoken of them in the highest terms of praise. The immense amount of saving in power, fuel, etc., is an item which all mining operators are interested in. The Sprague Company guarantee more power transmitted for amount of fuel used than can possibly be gained by any other method of transmitting power, and to mining operators, where the source of power is at a distance from the plant, there are no means so adaptable as the electric motor. The company are now located in their handsome new offices in the Rialto Building, Chicago.

—— The sixth dynamo was set in position at the Cohoes, N. Y., electric light works last week It will maintain 60 lamps of 2,000 candle-power each. The entire plant is capable of maintaining one hundred and sixty 2,000 candle-power lights.

—— The sales of the Westinghouse Electric Company for the first 10 days of November of alternating current incandescent apparatus amounted to 15,500 lights: Whitewater, Wis., 500; Oconto, Wis., 500; Des Moines, Ia., 1,000; South Berwick, Me., 750; Glenwood, Wis., 500; Tacoma, Wash., 750; Butte, Mont., 750; Eagle Pass, Tex., 750; San Francisco, Cal., 10,000.

Solar Rays as Cause of Electrical Phenomena.

From May, 1885, to July, 1889, Mons. Albert Nodon has made numerous observations showing that solar rays are the cause of certain electrical phenomena. He arrived at the following conclusions: 1. If solar rays impinge upon an isolated conductor (metals or carbon), they impart to it a *positive* electric charge. 2. The strength of this charge increases with the intensity of the solar rays, and decreases with the increase of watery vapor in the atmosphere. In Paris these effects reached maximum in summer about 1 P. M., when the air was clear and dry. 3. If clouds obscure the sun these effects cease.

These experiments were made in the following manner: A metallic plate was placed on a Mascart stand in the middle of a large metal case. This case was connected to earth, and formed a sort of Faraday cage. An opening in the cover permitted the solar rays' entrance in the cage, where they fell on the metal plate. The latter was connected to an electrometer to determine the strength of the charge.

If we are allowed to extend the results of these experiments to non-conducting bodies, the solar rays might be considered as the cause of the electric conditions of the clouds.

Water Color Paintings and the Incandescent Electric Light.

(From London *Public Opinion*.)

Mr. J. J. Hissey of Raven's Moat, Eastbourne, writes: "Now that the electric light is being generally introduced into our houses, it may be well to caution those possessing valuable water color paintings against placing the electric lamps in close proximity to their pictures, as I have found, after three years' experience of the electric (incandescent) light in my own home, that so placed the new illuminant is sufficiently powerful to cause some of the more delicate pigments to fade to a greater or lesser degree. Water colors that are safe in diffused daylight are certainly not always so when exposed night after night, for many hours, to the active white light of electricity close at hand."

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ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE ISSUED ON NOVEMBER 12, 1889.

414,686 Electric light post; Patrick J. Dinn, Boston, Mass.

414,695 Electro-mechanical trepping machine; Thomas F. Gaynor, Louisville, Ky., assignor to the Gaynor Electric Company, same place.

414,714 Electric heater; Michael B. Leonard, Richmond, Va.

414,741 414,742 Incandescent electric lamp; Geo. W. Wilson, Boston, Mass.

414,737 414,738 Electric fan motor; Philip Diehl, Elizabeth, N. J.

414,760 Phonograph; Thomas A. Edison, Llewellyn Park, N. J.

414,763 Automatic circuit making and breaking mechanism for gas lighting; Willard W. Eastbrook, Boston, Mass.

414,773 Electric railway signal; William P. Kookogey, Brooklyn, N.Y., assignor to Kookogey Electric Company, same place.

414,792 Cut-out for incandescent lamps; Turner D. Bottone, New York, N.Y., assignor to J. B. Tibbits, Hoosick Falls, N.Y.

414,798 Electric light support; Alfred Dawes, Chelsea, Mass.

414,866 Electric current indicator; Jacob F. Mehren, Chicago, Ill.

414,868 Electric indicator; Frank E. Morgan, New Haven, Conn., assignor to New Haven Clock Company, same place.

414,879 Electric indicator; Daniel W. Edgecomb, New York, and Charles A. Terry, Whitestone, assignor to the Porter Electric Messenger Company, New York, N. Y.

414,900 Dynamo electric machine; Henrich Gresenhöuer, Schenectady, N.Y.

414,922 Incandescent lamp socket; Samuel Rodman, Jr., U. S. Army.

414,933 Street lamp post for electric lamps; Frederick U. Adams, Chicago, Ill., assignor of one-half to Leroy B. Firman, same place.

414,953 Secondary battery; William Roberts, Toronto, Ontario, Canada.

414,963 Telephone receiver holder; Horace M. Wilson, Cambridge, Mass.

414,970 Conduit for electric wires; Horace B. Camp, Cuyahoga Falls, Ohio.

415,070 Electric motor support; Sidney H. Short, Columbus, Ohio.

415,165 Electric locomotor; Joseph R. Finney, National City, Cal., assignor by mesne assignments to the Overhead Conductor Electric Railway Company, Pittsburgh, Pa.

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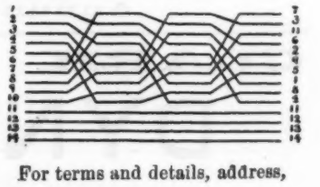

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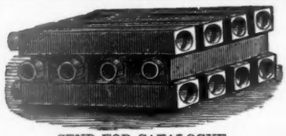

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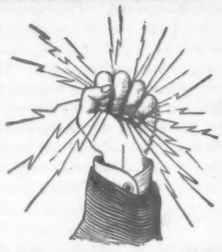

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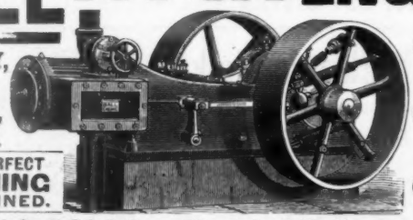

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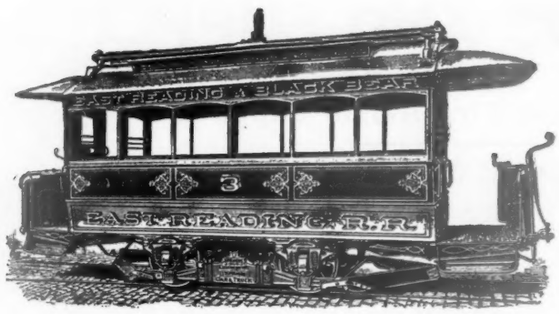

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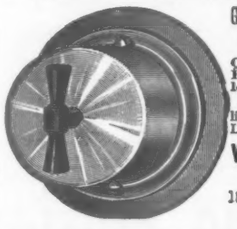

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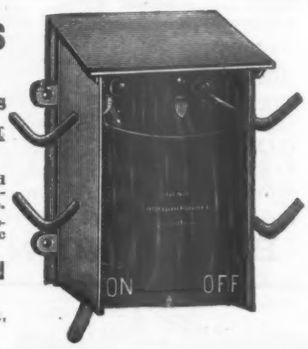

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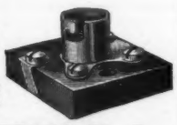

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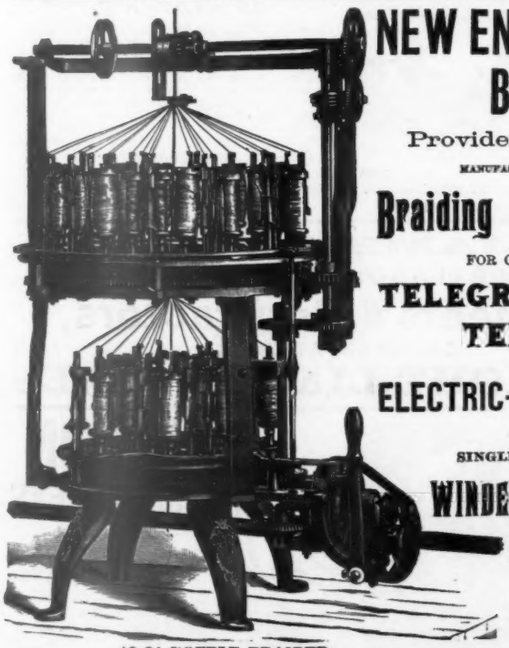

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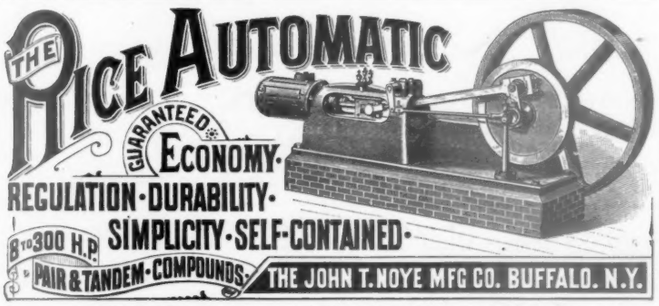

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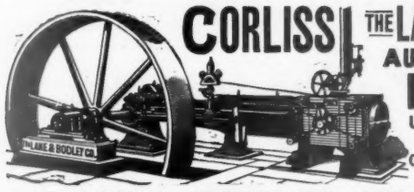

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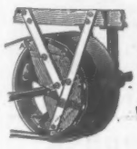

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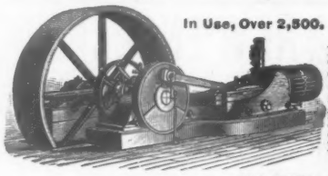

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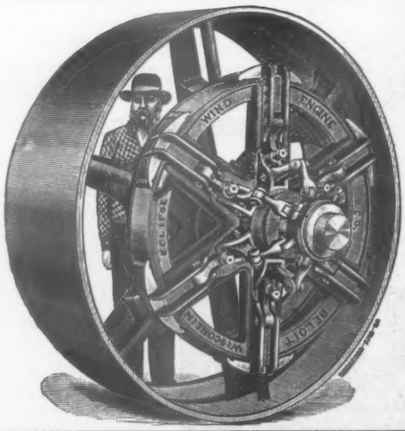

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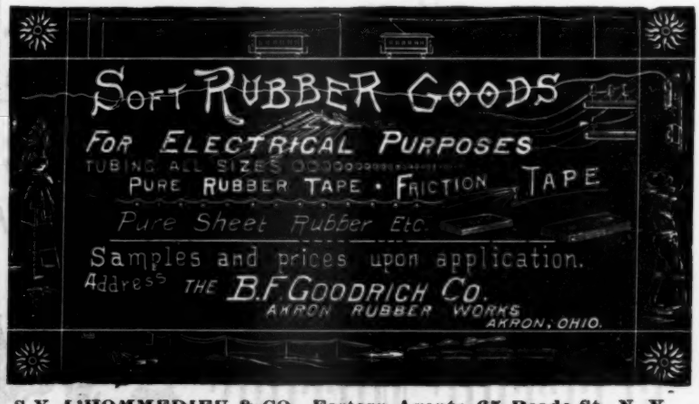

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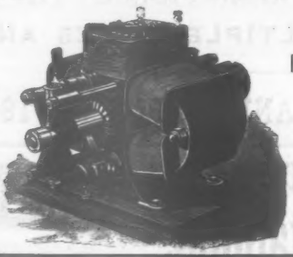

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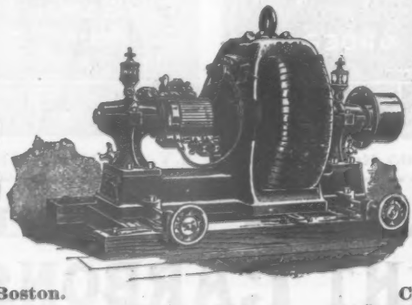

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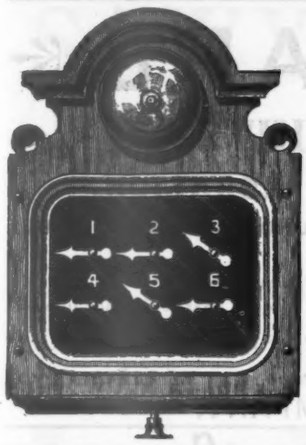

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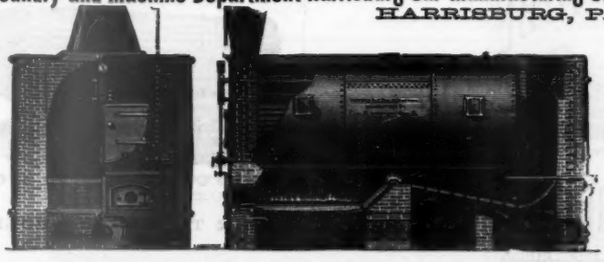

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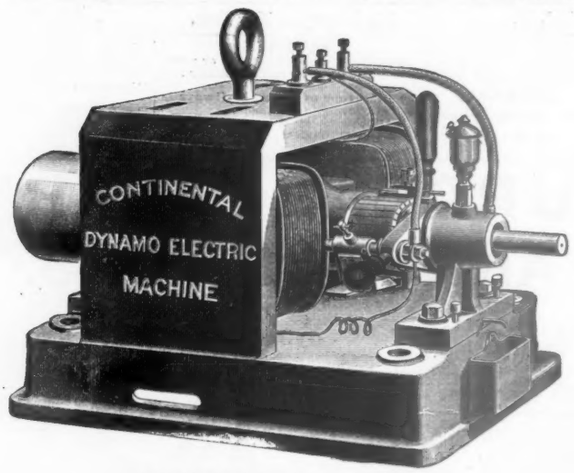

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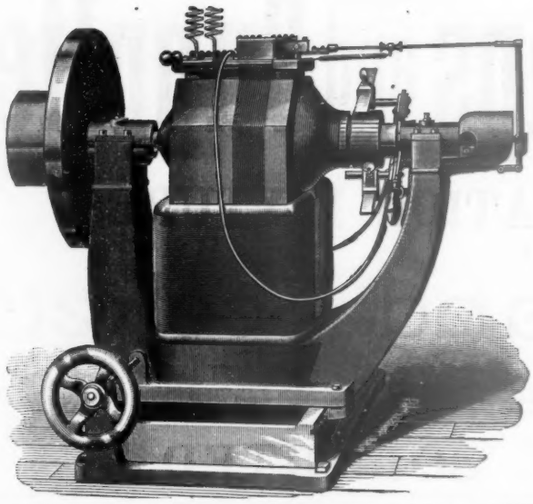

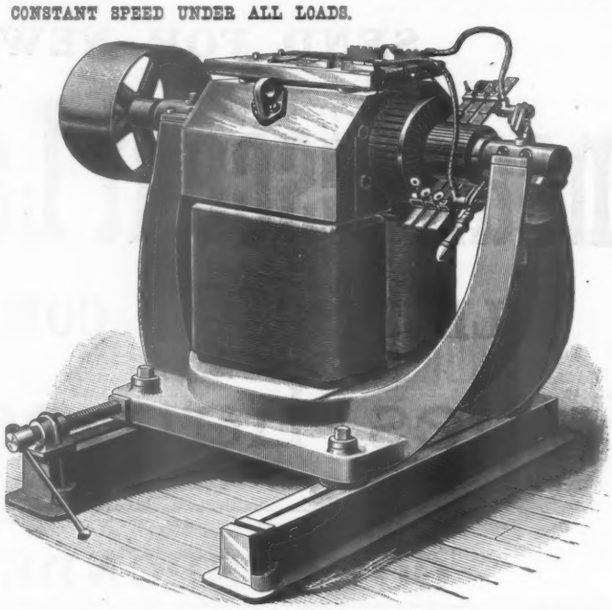

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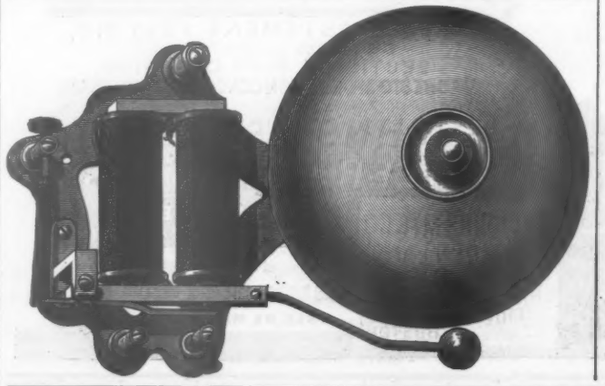

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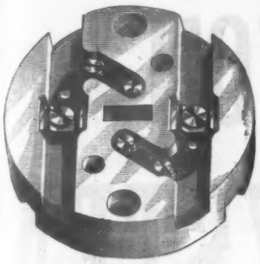

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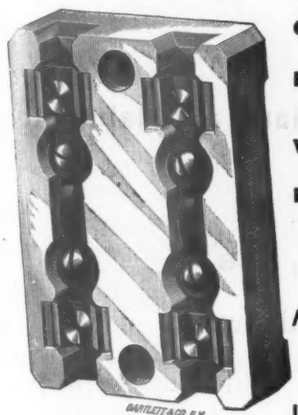

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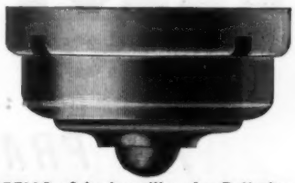

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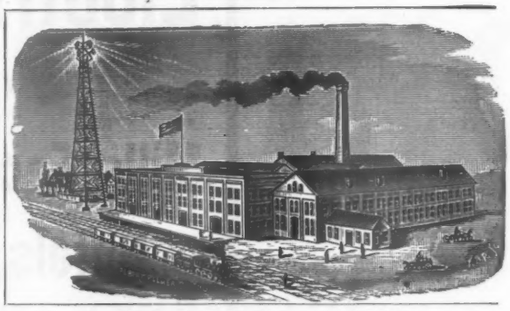

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